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Note.—Initialed reviews are written by the following:—

Mrs. R. H. Richens	R. H. R.

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* General studies, see also individual crops.

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Plant Breeding Abstracts

Vol. XXIII, No. 2

*STATISTICS

800 DICK, I. D.
The equivalence of factor analysis and confluence analysis in problems of multicollinearity.
N.Z. J. Sci. Tech. 1952 : **33** : Sect. B. : 345–47.

Two examples are worked to demonstrate that statistical factor analysis and confluence analysis yield identical results; the former approach, however, involves less computation.

801 DUTTON, A. M.
Statistical analysis of long-term agricultural experiments.
Iowa St. Coll. J. Sci. 1952 : **26** : 198–99.

The classical method of analysing long-term agricultural experiments by fitting linear functions of orthogonal time polynomials to the yields from each plot by the method of least squares is criticized. An alternative yield model is proposed consisting of a simple autocorrelated error superposed on an exponential trend, for which maximum likelihood estimators for the parameters involved and confidence interval rules are worked out where possible. A range of models is considered from the simple case of a single series with a linear regression on an independent variate and a simply autocorrelated error to the case of K correlated series with exponential regression and an autocorrelated error model.

802 HEALY, M. J. R.
The analysis of lattice designs when a variety is missing.
Emp. J. Exp. Agric. 1952 : **20** : 220–26.

A method of analysis of simple, triple and balanced lattice designs in which one variety or treatment is missing is given. This method is based on intrablock analysis and is appropriate to heterogeneous land. Under more uniform conditions, randomized-block analysis may be applied.

803 THOMPSON, H. R.
Factorial designs with small blocks.
N.Z. J. Sci. Tech. 1952 : **33** : Sect. B. : 319–44.

Confounded designs are given for $p \times p$, $p \times q$, $p \times (p-1)$, 3x2x2, 3x3x2, 3x3x3, 4x2x2, 4x3x2, 4x4x2, 5x2x2, 5x3x3, 5x4x2 and 5x5x5 layouts. By confounding to a greater degree than usual, the number of plots per block has not been allowed to exceed 5.

804 KNOWLES, R. P.
The use of lattice designs for testing forage crops.
Sci. Agric. 1952 : **32** : 614–17.

Lattice designs have shown marked increases in efficiency over randomized blocks in forage production trials of wheatgrass, brome and lucerne strains. Gains in efficiency were greatest with a large number of strains and when long, narrow replicates were used. In seed production tests, the gain in efficiency was lower.

*GENETICS

805 GLUSHCHENKO [GLUŠČENKO], I.
The struggle for a materialistic science.
Interagra 1952 : **6** : 395–98.

After referring to Mičurinite work done in Rumania by Savulescu, in Bulgaria by Gheorghieva, and in Poland by Dembowski, appreciative reference is made to recent publications by Fyfe and Morton in England (cf. *PBA*†, Vol. XXI, p. 451 and Vol. XXII, p. 163). Exception is taken however to Fyfe's views on chromosomes, which are believed still to show traces of Weismann-Morganist thinking.

806 SEGAL, J.
Il meccanismo dell'eredità e le teorie di Miciurin e Lysenko. (**The mechanism of heredity and the theories of Mičurin and Lysenko**).
Ital. Agric. 1952 : **89** : 690–96.

The views of Lysenko on the problem of the effect of environment on inheritance are presented once again (cf. *PBA*, Vol. XVII, Abst. 580 and Vol. XVIII, Abst. 50) in this Italian translation of a French article.

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* General studies, see also individual crops.

† *Plant Breeding Abstracts.*

807 SPRUIT, C.
Logica, selectie en erfelijkheidsleer. (**Logic, selection and genetics**).
Vakbl. Biol. 1952 : **32** : 128–34.

SIRKS, M. J.
Logica, selectie en erfelijkheidsleer. (**Logic, selection and genetics**).
Ibid, 1952 : **32** : p. 157.

In defence of his view that inheritance can be studied by means of clonal selection, C. Spruit, taking his stand on Hegel's system of logic, criticizes the geneticist's attitude towards the concepts of quantity and quality.

In the second paper M. J. Sirks replies to some of C. Spruit's arguments on the scientific aspect and, in particular: (1) his belief that geneticists commonly hold the view that "heredity [het erfelijke] is modified by environmental conditions" and (2) his statement that "all characters are always explained as heritable."

808 Excursie naar de landbouwhogeschool te Wageningen op 19 Juli 1952. (**An excursion to the Agricultural College at Wageningen on 19 July, 1952**).
Erfelijkh. i. Prakt. 1952 : **13** : No. 4 : 4–7.

At the Genetics Laboratory, visitors inspected research on genetic problems relating to stocks, tobacco, beans and rye, and to reciprocal grafting of tomato and tobacco, and induced polyploidy in grasses.

Demonstrations at the Institute of Agricultural Crop Breeding, and the new laboratory of the Plant Breeding Foundation [Stichting voor Plantenveredeling] included research on the production of *Phytophthora* resistant varieties of potatoes (cf. Absts. 44 and 468), bud mutants and periclinal chimeras in the potato; induced polyploidy in rye and other plants; and induction of flowering in the potato by grafting on tomato plants.

809 HARTE, C. and BISSINGER, B.
Entwicklungsgeschichtliche Untersuchung der durch die Faktoren *fr* und *ster* bedingten Pollensterilität bei *Oenothera*. (**Ontogenetic investigation of sterility in *Oenothera* conditioned by the factors *fr* and *ster***).
Z. indukt. Abstamm.- u. VererbLehre 1952 : **84** : 251–69.

Comparison of the development of anthers in plants homozygous for the respective genes showed certain differences in the time at which the degeneration effects set in. Both genes caused abnormal secretion from the tapetum, leading to a disintegration of the pollen grains after they had been formed normally. In the heterozygous state the genes are without effect, which indicates that they exert their action not on the pollen itself but on the diploid tissue which produces it.

810 DILLEMAN, G.
Hérédité du principe cyanhydrique chez divers hybrides interspécifiques. (**Inheritance of cynanide in various interspecific hybrids**).
CR Soc. Biol., Paris 1950 : **144** : 1470–72.

F_1 hybrids between *Ribes odoratum* and *R. sanguineum*, *Sambucus nigra* x *S. racemosa* and quince x pear, the first parent in each case being cyanogenetic and the second not, were all found to be intermediate between the parents in HCN content.

811 HAZAMA, K.
(**The synthesis of floral pigments and their inheritance**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 178. [Japanese].

Recent work on the above topics is summarized.

812 NOVAK, J.
Sur l'hérédité des caractères quantitatifs. (**On the heredity of quantitative characters**).
CR Soc. Biol., Paris 1946 : **140** : 929–31.

A polynomial formula is derived for representing the size of a quantitative character in the F_1 from crosses involving dominant or intermediate homomeric genes controlling the character.

813 MACKENDRICK, M. E. and PONTECORVO, G.
Crossing-over between alleles at the *w* locus in *Drosophila melanogaster*.
Experientia 1952 : **8** : 390–91.

Preliminary results have been obtained indicating that crossing-over occurs between certain alleles at the locus *w* in *D. melanogaster* and is correlated with the origin of a new allele.

814 RÜMKE, C. L.
Beschouwingen over crossing-over en chiasmata. (**Considerations on crossing-over and chiasmata**).
Vakbl. Biol. 1952 : **32** : 85–96.

This critical discussion arose out of the wording of the following example in Riley's Introduction to Genetics and Cytogenetics (cf. *PBA*, Vol. XIX, p. 911): "show that by applying the binomial theorem the number of non crossover and single crossover, etc. chromatids may be easily calculated no matter how many chiasmata form between two genes." The writer questions whether the genetically demonstrated chiasmata in early diplotene have been satisfactorily shown to correspond to the loci of crossing over of the chromatids. Though in the English literature crossing over in the chiasmata is often accepted as occurring in a 4-strand stage, the evidence of Cooper and of Sturtevant does not bear this out.

815 MALINOWSKI, E.
The problem of heterosis. VI. Different shapes of the F_2 frequency distributions.
Bull. Acad. Polon. Sci. Lettres, Cracovie 1951 (1952) : Sér. B. : 41–76.

Data are presented on the height and vigour of the F_1 and F_2 of intervarietal crosses in *Phaseolus, Petunia, Antirrhinum, Galeopsis, Gossypium* and *Zea Mays* to distinguish two kinds of heterosis. The first, considered true heterosis, is characterized by F_1 hybrids superior to the better parent and by an F_2 frequency distribution which is positively skew, with the mode corresponding to the average of the parents. The second type, designated hypothetical heterosis, has an intermediate F_1 more or less superior to the average of the parents, while the F_2 frequency distribution is symmetrical or negatively skew.

The hypothesis of cooperating factors, outlined in a previous paper (cf. *PBA*, Vol. XX, Abst. 2032), is discussed in respect of both types of heterosis, with formulae for determining the number of factors involved. Since the presence of all factors is needed to bring about heterosis, the term complementary factor is now considered more appropriate.

816 RIETSEMA, J.
The presence of indole-3-acetic acid in ovular tumors of incompatible *Datura* crosses and its possible role as an embryo inhibitor.
Genetics 1952 : **37** : p. 618. (Abst.).

Evidence has been obtained suggesting that the presence of indole-3-acetic acid in ovular tumours of incompatible interspecific crosses of *Datura* may be one cause of embryo abortion.

817 BREIDER, H.
Über die Inaktivierung von Genen, Genkomplexen und Genomen. (**The inactivation of genes, gene complexes and genomes**).
Z. Pflanzenz. 1952 : **31** : 433–56.

Reference is made to numerous cases in which, by adjustment of modifiers, the manifestation of a dominant gene may be reduced or suppressed and *vice versa*, and of similar effects brought about by the cytoplasm, even by cytoplasmic differences within a cell as in differentiation. The reactivation of genes that have been suppressed in the course of evolution may serve as an explanation of certain cases of reversion reported by fruit growers, such as the sudden appearance of blue grapes on a white-fruited vine, of virescence and of other floral anomalies. The degree of expression is influenced by environment and by physiological conditions such as hormone development, and by genetic constitution. Thus virescence was observed in the flowers of a hybrid of two *Vitis vinifera* varieties, St. Laurent x Triumph, neither of which had themselves shown any tendency to virescence, and the degree of expression varied even within a single inflorescence.

Inactivation of the entire genome by a certain gene has been observed to give rise to tumours and cancerous growth. Less extreme changes in activation of the genome could, it is thought, account for all the phenomena observed by the Mičurin school, without the necessity of assuming the inheritance of acquired characters or directed mutation.

VARIATIONS, MODIFICATIONS, MUTATIONS

818 LUDWIG, W. and v. SCHELLING, H.
Der Inzuchtgrad in endlichen panmiktischen Populationen. (**The degree of inbreeding in finite panmictic populations**).
Biol. Zbl. 1948 : **67** : 268–75.

Formulae are derived for calculating the degree of inbreeding to be expected in panmictic populations of various sizes and after any number of generations.

819 MOREE, R.
A procedure for the detection and measurement of assortative mating.
Genetics 1952 : **37** : 606–07. (Abst.).

Formulae are given for determining the coefficient of assortative mating of a population by setting up an initial subpopulation with the genotypes in panmictic proportions and calculating the extent of the deviations from panmictic proportions in the second generation, making due allowance for selection and heterosis.

820 MULLER, H. J.
The standard error of the frequency of mutants some of which are of common origin.
Genetics 1952 : **37** : p. 608. (Abst.).

In calculating s_p, the standard error of mutation frequency (p) in colonies where proliferation rates are unequal and some mutants may be of common origin, the revised formula

$$s_p^2 = (1 - p)\ \Sigma\ (r^2 I_r)/n$$

may be used, where r denotes the size of a given run, I_r the number of independent mutations in runs of r size, and n the total number of cells tested. It is presupposed that mutants of common origin can be identified as such.

821 NEWCOMBE, H. B.
The copy-error concept of gene mutation.
Genetics 1952 : **37** : p. 610. (Abst.).

It is pointed out that there are two commonly held concepts of gene mutation (1) a molecular change caused by mutagenic chemicals within the cell and (2) an inaccurate self duplication of the gene. The first concept has recently been expanded to apply to all mutations, whatever their origin, whereas the second has been considered mainly in relation to spontaneous change. The author's work on bacterial genetics leads him to suggest that the two concepts can be combined, the amount of mutagen in the cell determining the likelihood of error in gene duplication.

822 ALTENBURG, L. S. and ALTENBURG, E.
The lowering of the mutagenic effectiveness of ultraviolet by photoreactivating light in *Drosophila*.
Genetics 1952 : **37** : 545–53.

Evidence has been obtained that photoreactivating light may lower the mutagenic effectiveness of ultraviolet radiation to the extent of almost completely abolishing it. Thus in *Drosophila* photoreactivating light has an even greater inhibitory action upon mutagenesis due to ultraviolet than on the physiologically toxic effect of this type of radiation in bacteria. It is suggested that probably photoreactivating light has no effect on the process of mutation itself, but simply prevents it from occurring, possibly by neutralizing some mutagenic product of ultraviolet radiation before the product in question can become effective.

823 ARLEY, N.
Atomteori og biologi. (**Atomic theory and biology**).
Nat. Verd., Kbh. 1952 : **36** : 207–17.

The introduction to a series of lectures on the applications of atomic theory to research on genetics, cancer and viruses forms the substance of this paper. The various working hypotheses, accepted or provisionally adopted by experimental biologists, are defined and examined in the light of recent work on effects of radiation on living cells (cf. *PBA*, Vol. XIX, Abst. 52).

824 LATARJET, R.
Production d'une mutation bactérienne par des substances cancérigènes ou non. (**Production of bacterial mutations by carcinogenic and noncarcinogenic substances**).
CR Soc. Biol., Paris 1948 : **142** : 453–55.

The carcinogenic substance methylcholanthrene proved ineffective in inducing mutation in *Escherichia coli* B, in contrast to the considerable mutagenic activity of such feebly carcinogenic substances as sodium 1,2,5,6-dibenzanthracene-α, β-endosuccinate, Styryl 430, cholic acid and desoxycholic acid.

825 DAVIS, E. A.
Photosynthetic *Chlorella* mutants.
Amer. J. Bot. 1952 : **39** : 535–39.

Further details are given of the ultraviolet-induced mutants 322, 332 and 349 which are abnormal with respect to photosynthesis although they contain chlorophyll (cf. *PBA*, Vol. XXI, Abst. 1476).

826 FREDERICQ, P. and JOIRIS, E.
Indépendance des mutations bactériennes vis-à-vis du substrat. (**Independence of bacterial mutations with reference to the substrate**).
CR Soc. Biol., Paris 1949 : **143** : 1008–11.

Experiments with single spore cultures of paracolon bacilli and *Shigella sonnei* are quoted to show that the appearance of lactose and sucrose positive mutants depends on selection of preexisting individuals and is not an adaptive response.

827 MALCHAIR, R.
Staphylocoques résistants à l'actinomycine. (**Staphylococci resistant to actinomycin**).
CR Soc. Biol., Paris 1949 : **143** : 1144–47.

Dilution tests with normal cultures of *Staphylococcus aureus* have not revealed any preexisting individuals highly resistant to actinomycin. After having been acquired, resistance is gradually lost if the stock is cultured in the absence of actinomycin. It is suggested that resistance is acquired through selection of random mutations occurring in each generation during which the stock is grown in the presence of the antibiotic.

828 Malchair, R.
Des conditions d'apparition de résistance à l'actinomycine chez *Staphylococcus aureus*. (**Some conditions for the appearance of resistance to actinomycin in *S. aureus***).
CR Soc. Biol., Paris 1950 : **144** : 1247–50.

S. aureus grown for 3 days in media containing a high concentration of actinomycin proved no more liable to produce actinomycin-resistant cells than a culture exposed to the antibiotic for 1 day. This observation is urged against the hypothesis that resistance is acquired by an adaptive response.

829 Malchair, R.
Distribution des sensibilités individuelles à l'actinomycine dans les populations staphylococciques normales et résistantes à cet antibiotique. (**Distribution of individual susceptibility to actinomycin in normal populations of staphylococcus and in populations resistant to this antibiotic**).
CR Soc. Biol., Paris 1950 : **144** : 713–15.

Dilution tests have shown that normal *Staphylococcus aureus* and cultures showing various degrees of adaptation to actinomycin are practically homogeneous in respect of degree of resistance to actinomycin. It is thought, nevertheless, that adaptation may occur through selection of extreme variants.

830 Welsch, M.
Variations individuelles de la sensibilité à la streptomycine dans les populations staphylococciques normales. (**Individual variations in the susceptibility to streptomycin of normal populations of staphylococcus**).
CR Soc. Biol., Paris 1949 : **143** : 1141–44.

By suitable dilution techniques it has been shown that in normal culture of *Staphylococcus aureus* there exists about 1 highly streptomycin-resistant individual per 10^7 normal cells. This fact does not, however, entirely rule out the possibility that streptomycin resistance may be acquired adaptively.

831 Welsch, M.
Distribution en série de Poisson, des germes totalement résistants à la streptomycine des populations staphylococciques normales. (**Poisson distribution of individuals totally resistant to streptomycin in normal populations of staphylococcus**).
CR Soc. Biol., Paris 1950 : **144** : 432–34.

In further support of his contention that the development of streptomycin resistance in *Staphylococcus aureus* can be explained by selection of preexisting variants, the author shows that the distribution of preexisting resistant individuals follows a Poisson distribution.

832 Welsch, M.
Origine des variants de *Staphylococcus aureus* "totalement" résistants à la streptomycine. (**Origin of the variants of *S. aureus* "totally" resistant to streptomycin**).
CR Soc. Biol., Paris 1950 : **144** : 732–35.

A statistical analysis of the frequency of highly streptomycin-resistant individuals in different *S. aureus* cultures has shown that this value tends to be constant. This is explained as a consequence of competition between normal and resistant cells.

833 Welsch, M.
Développement d'individus "totalement" résistants à la streptomycine dans les populations staphylococciques cultivées en présence de cet antibiotique. (**Development of individuals "totally" resistant to streptomycin in populations of staphylococcus grown in the presence of this antibiotic**).
CR Soc. Biol., Paris 1950 : **144** : 981–84.

It has been shown, by dilution tests, that the increase in resistance to streptomycin by cultures of *Staphylococcus aureus* grown in contact with this antiobiotic is caused by an increase in the proportion of resistant individuals and is not brought about by a homogeneous change in the whole population. The importance of distinguishing between a truly resistant population, in which all the individuals are resistant, and an apparently resistant population, in which many individuals are susceptible, is emphasized.

834 WELSCH, M.
Effet du contact passager avec la streptomycine sur les bactéries non proliférantes. (**Effect of brief contact with streptomycin on nonproliferating bacteria**).
CR Soc. Biol., Paris 1950 : **144** : 1142–44.

Contrary to the findings of Linz (cf. Abst. 836), evidence from dilution tests is brought forward to show that the acquired resistance to streptomycin of *Pseudomonas aeruginosa* is brought about by selection of preexisting resistant cells.

835 LINZ, R. and LECOCQ, E.
Sensibilité à la streptomycine de bactéries cultivées en présence de streptomycine. (**Susceptibility to streptomycin of bacteria grown in the presence of streptomycin**).
CR Soc. Biol., Paris 1949 : **143** : 542–44.

Experiments on induced resistance of *Staphylococcus aureus* to streptomycin are described which suggest that resistance is acquired as an adaptive response, and not by the selection of preexisting resistant individuals.

836 LINZ, R., MARTIN, L. and LECOCQ, E.
Sur l'origine de la résistance acquise par des bactéries sensible à la streptomycine. (**On the origin of acquired resistance in bacteria susceptible to streptomycin**).
CR Soc. Biol., Paris 1949 : **143** : 728–29.

The induction of resistance to streptomycin in *Pseudomonas aeruginosa* by exposure to concentrations of the antibiotic cell below the bacteriostatic threshold is described. These experiments are thought to show that resistance is acquired by adaptation and not by selection of preexisting variants.

837 LINZ, R., LECOCQ, E. and WAUTERS, G.
Analyse d'une culture devenue résistante après contact passager avec la streptomycine. (**Analysis of a culture that had become resistant after a brief contact with streptomycin**).
CR Soc. Biol., Paris 1949 : **143** : 1279–80.

The acquisition of resistance to streptomycin by stock R of *Pseudomonas aeruginosa* occurs even though little cell division may have taken place. This would seem to rule out the possibility that preexisting resistant individuals were replacing the susceptible cells.

838 LINZ, R. and LANE, J.
Sur un variant de *Micrococcus lysodeikticus* dépendant de la streptomycine. (**On a variant of *M. lysodeikticus* dependent on streptomycin**).
CR. Soc. Biol., Paris 1950 : **144** : 441–42.

Three colonies resistant to and dependent on streptomycin appeared in a culture of *M. lysodeikticus* exposed to the antibiotic. In course of time, the quality of streptomycin dependence disappeared but the streptomycin resistance persisted. Possible explanations for these observations are considered.

839 FREDERICQ, P.
Mutations intéressant le spectre d'activité du bactériophage T.1. (**Mutations affecting the range of activity of the bacteriophage T1**).
CR Soc. Biol., Paris 1950 : **144** : 1258–60.

The mutant phage T1′ that arises when T1 is grown on strains Q and C 18 of *Escherichia coli* and which is able to lyse these strains does not preexist in T1 but appears while T1 is multiplying in these strains.

840 FREDERICQ, P.
Acquisition de propriétés antibiotiques nouvelles par une souche d'*E. coli* sous l'action de certains bactériophages. (**Acquisition of new antibiotic properties by a culture of *Escherichia coli* under the influence of certain bacteriophages**).
CR Soc. Biol., Paris 1950 : **144** : 1709–11.

When strain V of *E. coli* is acted on by bacteriophages T1, T5 or T7, it undergoes a mutation whereby it secretes a colicin not formed by the parent strain. This mutation is specific and can be induced at will.

841 FREDERICQ, P.
Induction spécifique de propriétés antibiotiques nouvelles sous l'effet de certains bactériophages. (**Specific induction of new antibiotic properties under the influence of certain bacteriophages**).
CR Soc. Biol., Paris 1951 : **145** : 141–43.

In a further discussion of the directed mutation described in Abst. 840 the possibility that the mutant preexisted in the parent stock is rejected.

842 FRÉDÉRICQ [FREDERICQ], P.
Recherches sur l'origine des mutants de *E. coli* V produisant la colicine M. (**Researches on the origin of the mutants of *Escherichia coli* V producing colicin M**).
CR Soc. Biol., Paris 1951 : **145** : 930–33.

Further to his earlier paper on a directed mutation in *E. coli* (cf. Abst. 840), the author reports that the mutant which produces colicin M is induced, not only by contact with phage T1 but also by contact with the antibiotic colicin C. This observation suggests that the mutant must, after all, have been spontaneous.

843 Bergann, F.
Über das Auftreten einer bisher unbekannten *Laburnum*-Form an der Pfropfchimäre *Laburnum Adami*. (**The appearance of a hitherto unknown *Laburnum* form on the graft chimera *L. Adami***).
Flora, Jena 1952 : **139** : 295–99.

The form described is clearly distinguishable from the parents and from *L. Adami* itself and has set fruits. It resembles *L. vulgare* in most features but contains a certain amount of anthocyanin in the floral epidermis, which may be ascribable to a mutant, or possibly to a burdo of the type described by Winkler in *Solanum* chimeras.

844 Sparrow, A. H., Denegre, M. and Haney, W. J.
Somatic mutations in *Antirrhinum* produced by chronic gamma irradiation.
Genetics 1952 : **37** : 627–28. (Abst.).

F_1 plants of *A. majus* with dark purple flowers but heterozygous for white, ivory, yellow and lavender colours and for intensity of flower colour were exposed to chronic γ radiation from Co^{60} for several weeks at dose rates varying from a few to over 300 r. per day. After an adequate period of irradiation, small light-coloured spots or streaks appeared upon the flowers, producing a characteristic mottling effect. On the assumption that each light-coloured area represented one mutation, the relationship of the number of mutations to dose rate or total dosage was determined.

845 Buchholz, A.
Grundzüge und Entwicklungstendenzen der sowjetischen Naturwissenschaft. (**Fundamental characteristics and tendencies in development of Soviet science**).
Osteuropa 1952 : **2** : No. 3–4 : Pp. 16.

In an objective analysis of the present position of science in the USSR reference is made to the failure of Lysenko's proposed method of cluster planting of oak seedlings in stubble in 1951, to the difficulty in verifying most of his tenets, and to Soviet criticisms of the theory of relativity, of Jeans's view of life on other planets, of Virchow and his school, of Orbeli for deviation from Pavlov's doctrine, of Darwinism because of its relation to Morganism and of Pasteur for rejecting the principle of spontaneous origin of living matter; the significance of the isolation of Soviet science from all foreign influence is emphasized.

EVOLUTION

846 Arcangeli, A.
L'evoluzione degli organismi, concezione inoppugnabile e necessaria per il biologo, non è dimostrabile sperimentalmente, essendo ormai ultimata. (**The evolution of organisms, an incontrovertible and necessary conception for the biologist, is not experimentally demonstrable, being now completed**).
Ann. Acad. Agric. Torino 1950–1951 : **93** : 71–87.

The author sustains that no evidence is forthcoming that subspecies are incipient species, that a new species has ever arisen by mutation, or that those mutants that have been preserved in special niches are progressive and anything but a step towards extinction. Even new genera created by hybridization, such as *Raphanobrassica*, are regarded as "jokes" and would not, it is submitted, be capable of maintaining themselves in nature. Evolution is now completed and no further progress can be expected.

847 Lysenko, T. D.
(**The vigour of plant and animal organisms**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 3–8. [Russian].

The inheritance and vigour of an organism are two distinct but closely interrelated properties. Life is regarded as a definite state of development of organic matter under certain environmental conditions; the concept of vital force is rejected as metaphysical. Vigour is manifested in the degree of fertility; it results from the internal conflict within heterogeneous organisms. Heterogeneity is not necessarily due to hybridization but may be caused by varied external conditions. The varying degrees of sterility in inbred material are explained by homozygosity; theories invoking lethal genes are regarded as unsubstantiated.

The vigour of standard cereal varieties can be increased, without changing their heritable properties, by intravarietal and intervarietal pollination and selection of the female parents in the F_1 and F_2.

848 Conrad-Martius, H.
Das Artproblem in naturphilosophischer Beleuchtung. (**The species problem in the light of natural philosophy**).
Experientia 1952 : **8** : 400–04.

Abandoning the traditional criteria of differences between species and subspecies in the plant and animal worlds, the writer proposes and discusses the empirical definition of a species as the aggregate of subspecific forms developed through evolution. The acceptance of such a definition raises anew the problem of whether species distinctions are based on essential metaphysical differences.

In discussing the determination of species, special reference is made to the views put forward by Camp and Gilley (cf. *PBA*, Vol. XIV, Abst. 789 and Vol. XXI, Abst. 2373).

849 Haskell, G.
Polyploidy, ecology and the British flora.
J. Ecol. 1952 : **40** : 265–82.

A statistical investigation of the occurrence and distribution of polyploids in the British flora is reported. The frequency of polyploids was estimated from the coefficient of polyploid types (CPT), using the following formula: $CPT = \frac{p + p'}{(p + p') + (d + d')}$, where d and p represent the number of diploid and polyploid species respectively, and d' and p' are the diploid and polyploid chromosome races within species.

Monocotyledons have a much higher *CPT* than dicotyledons, as in other floras. The hypothesis of polyploidy increasing with latitude and altitude is confirmed in numerous species; generally, *CPT* values are high for Scottish and highland species and low for Atlantic and Germanic elements. It is also noted that perennials often have a higher *CPT* than annuals; polyploidy may cause a diploid annual to change to the perennial habit, but perennial diploids remain perennial if polyploidy occurs. Correlation was found between high *CPT* and extreme habitat, with respect to soil moisture. Contrary to the observations of Löve and Löve (cf. Abst. 6) evidence is presented for a relationship between polyploidy and vegetative reproduction and apomixis.

Polyploidy is shown to have had little influence on the spread of aliens, the general comital frequency or the relative geographical distribution of diploid and tetraploid species within a genus.

850 McVaugh, R.
Suggested phylogeny of *Prunus serotina* and other wide-ranging phylads in North America.
Brittonia, NY 1952 : **7** : 317–46.

A study of the present geographical distribution of *P. serotina* (cf. *PBA*, Vol. XXII, Abst. 2211) and other angiosperm species and genera in North America leads the author to suggest that many groups underwent south-to-north migration and differentiation into eastern and western populations in that continent during precenozoic and Cenozoic times. Many genera, e.g. *Morus*, *Cercis*, *Ulmus* and *Platanus*, normally regarded as having a northern origin, are thought instead to be southern in origin. The geographical data delineate rather sharply the genetic lines by which the members of the phylads are radially connected. The taxonomical significance of this situation is discussed. While plants such as *P. serotina* and *P. virens*, for example, may be morphologically separable, strong evidence exists that they are in fact branches of an evolutionary stock with its centre still in Central America. It is also suggested that the validity of the supposed distinctions between eastern and western species in many cases requires reexamination.

*CYTOLOGY

851 Turchini, J. and Gosselin de Beaumont, L. -A.
Application d'une réaction nucléale nouvelle à l'étude de divers noyaux de cellules végétales. (**Application of a new nucleal reaction to the study of various nuclei in plant cells**).
CR Soc. Biol., Paris 1945 : **139** : 584–86.

The use of 9-phenyl-2,3,7-trihydroxy-6-fluorone for nuclear staining is described. This reagent differentiates between ribose and desoxyribose produced by hydrolysis of the respective nucleic acids.

852 Taylor, J. H.
Phosphorus 32 detection by autoradiographs as a method for studying nucleic acid metabolism in individual cells.
Genetics 1952 : **37** : p. 632. (Abst.).

Inflorescences of *Lilium longiflorum* were grown in solutions of phosphate with P^{32} at activities of 20–40 μc./ml. By means of autoradiographs it was found that phosphorus became incorporated in the desoxypentose nucleic acid (DNA) fraction during relatively short periods of the cell cycle. P^{32} was incorporated in the DNA of the chromosomes during a period of 12 hours or less just preceding the onset of meiotic prophase; no further incorporation occurred during meiosis. The next period of incorporation was of a similar duration, 36–48 hours prior to the prophase of the microspore division. In the maturing pollen, the generative nucleus, but not the vegetative nucleus, incorporated phosphorus about 3 days after microspore division. These periods of P incorporation correspond to times of DNA synthesis and probably also of chromosome reproduction. The times of DNA synthesis follow a similar pattern in *Tradescantia paludosa*. The P turnover of the ribonucleic acid and phospholipid fractions has also been investigated by the same technique.

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* General studies, see also individual crops.

853 PATAU, K.
The DNA content of nuclei in root tips of *Rhoeo discolor*.
Genetics 1952 : **37** : p. 612. (Abst.).

Absorption measurements of Feulgen-stained nuclei in longitudinal sections of *Rhoeo* roots were made by means of a Farrand phototube at $\lambda = 5461$Å. In the meristem, nuclear growth between telophase and prophase was correlated with cell size. Within a cell row, the desoxypentose nucleic acid (DNA) content was closely correlated with nuclear volume up to a certain magnitude, e.g. in one row with a volume of *ca.* 400 μ^3 the diploid amount (2C) was present. For nuclei of a higher range of volumes, *ca.* 400–600 μ^3, a positive regression of DNA content (2C–4C) on volume was obtained. The frequency of DNA values intermediate between the 2C and 4C classes in the actively dividing meristem indicated duration of DNA synthesis for several hours. Prophase began only after the conclusion of this synthesis. No intermediate DNA values were found in the elongation zone. DNA synthesis and onset of prophase are regarded as independent processes in that either can be blocked without immediate inhibition of the other. After completion of the mitotic period the volumes of the 2C and 4C nuclei increased slowly and retained, during cell elongation, approximately their initial average ratio of 1 : 1·5.

854 SIBATANI, A
Differential staining of nucleic acids. I. Methyl green-pyronin.
Cytologia, Tokyo 1952 : **16** : 315–24.

Tissues stained with methyl green and pyronin, individually and as a mixture, have been compared with precipitates formed by the addition of both dyes, alone and mixed together, to different nucleoproteins. Results indicate that differentiation is probably due to the preferential tendencies of methyl green and pyronin to combine with nucleic acids of high and low degrees of polymerization, respectively, rather than to the true selectivity of this staining reaction *in vitro* as suggested by Kurnick (cf. *PBA*, Vol. XX, Abst. 1369).

855 SIBATANI, A.
Differential staining of nucleic acids. II. Thionin and other metachromatic stains.
Cytologia, Tokyo 1952 : **16** : 325–34.

Metachromatic differentiation of nucleic acids *in vitro* is described, with particular reference to thionin which gives a blue colour with desoxypentosenucleic acid. The influence of proteins on these colour differences is discussed.

856 DELAY, C.
Recherches sur la structure des noyaux quiescents chex les phanérogames. (Deuxième partie). [**Researches on the structure of resting nuclei in the phanerogams. (Second part)**].
Rev. Cytol., Paris 1948 : **10** : 103–219.

Extensive data are provided on the distribution of the nuclear types recognized by the author (cf. Abst. 40) in the families of higher plants. It is noted that eureticulate and reticulate resting nuclei are more typical of plants with long chromosomes, while semireticulate and nonreticulate resting nuclei are more common in plants with short chromosomes. There appears, however, to be little connexion between the structure of the resting nucleus and chromosome number.

The structure of the resting nucleus is regarded as an important taxonomic character. The types of structure characteristic of the various families are indicated and the possible phylogenetic significance of the systematic distribution of the different types of nuclear structure is discussed.

857 NARAYANAN, C. R.
Nucleolar conditions in meiosis of *Barleria prionotis*.
J. Madras Univ. 1951 : **21** : Sect. B. : 232–35.

Differentiation of the nucleolus into an inner clear region and peripheral darker one has been observed during meiosis in *B. prionotis* and other members of the Acanthaceae, after staining with Heidenhain's iron alum and Newton's iodine gentian violet. Cases of collapse of the chromosomes at pachytene accompanied by the emergence of the inner part of the nucleolus in the form of a vesicle are attributed to the influence of the fixative.

858 Conger, A. D. and Fairchild, L. M.
Breakage of chromosomes by oxygen.
Proc. Nat. Acad. Sci. Wash. 1952 : **38** : 289–99.

The magnitude of the effect of oxygen on the chromosomes of dry pollen grains of *Tradescantia* is shown to be related to the period of exposure and to the partial pressure of the oxygen. After one hour in 100% oxygen, aberrations were comparable with those produced by X irradiation at 1200 r. A minimum aberration frequency was recorded in air, at a partial pressure of 20% oxygen. It is pointed out that the low percentage of aberrations considered to be spontaneous under normal conditions may in fact be caused by the presence of oxygen in the air.

Chromosome breakages were also observed in the pollen mother cells of plants grown in oxygen under 100 lb. pressure, but the treatment usually proved lethal before flower buds were formed.

859 Riley, H. P., Giles, N. H. (Jun.) and Beatty, A. V.
The effect of oxygen on the induction of chromatid aberrations in *Tradescantia* microspores by X-irradiation.
Amer. J. Bot. 1952 : **39** : 592–97.

Since Sax has shown that transition from chromatid to chromosome breakage occurs between 27 and 31 hrs. after X-irradiation, the effects of oxygen tension on chromatid aberrations have been observed 24 hrs. after treatment. A linear relationship was found between aberration frequency and X ray dose for both chromatid and isochromatid breaks, but for chromatid exchanges the relationship was exponential. A marked increase in frequency of all types of aberration occurred in the presence of 0–20% oxygen, after which the increase occurred more gradually.

Experiments on the influence of X ray intensity in the presence and absence of oxygen have shown that the frequency of chromatid and isochromatid breaks was unaffected; the frequency of exchange aberrations was, however, appreciably decreased at low intensities, both in nitrogen and in oxygen. As there is thus no difference in the average restitution time for breaks produced in the presence or absence of oxygen, it is assumed that these results support the hypothesis that oxygen exerts its effect by increasing the initial breakage frequency rather than by influencing the reunion of broken ends.

860 King, E. D. and Schneiderman, H. A.
The effects of carbon dioxide on the frequency of X-ray induced chromosome aberrations in *Tradescantia*.
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 809–12.

Data are presented to show that the presence of CO_2 at the time of irradiation increases the frequency of chromosomal aberrations induced in *Tradescantia* microspores by X-irradiation. The aberration frequency increases as the concentration of CO_2 becomes greater. There is as yet no indication whether CO_2 affects chromosome breakage or reunion of broken ends.

861 Giles, N. H. (Jun.), Beatty, A. V. and Riley, H. P.
The effect of oxygen on the production by fast neutrons of chromosomal aberrations in *Tradescantia* microspores.
Genetics 1952 : **37** : 641–49.

Investigations on the irradiation effects of fast neutrons have been continued (cf. *PBA*, Vol. XXII, Abst. 1629) in atmospheres of pure oxygen, nitrogen or helium. Aberrations in chromatids and in chromosomes were observed 24 hrs. and 4–5 days, respectively, after exposure. Data indicate that oxygen increases the frequency of all types of aberrations induced by fast neutrons. A quantitative comparison, however, has shown that the magnitude of the oxygen effect with fast neutrons is considerably greater than with α rays (cf. *PBA*, Vol. XIX, Abst. 762) and less than with X-rays (cf. *PBA*, Vol. XXI, Abst. 821 and Vol. XXIII, Abst. 859). There is thus an inverse relationship between the oxygen effect and the ionization density produced by a given type of radiation. This is interpreted in terms of differential reactions between oxygen and the H atoms and $-OH$ and $-O_2H$ radicals resulting from radiation.

The fact that the relationship between interchange frequency and fast neutron dosage is linear, in the presence or absence of oxygen, provides evidence for the localization of radiation effects in the immediate vicinity of particle tracks.

862 Navašin, M. S., Gerasimova-Navašina, E. N. and Jakovlev, M. S.
(The role of unorganized living substance during the reproductive processes in plants).
Izv. Akad. Sci. SSSR (News Acad. Sci. USSR) 1952 : No. 5 : 8–32. [Russian].

The development of young reproductive cells from phasically mature tissues of various plants, including wheat, was investigated on the basis of the theories of Lepešinskaja (cf. *PBA*, Vol. XXI, Abst. 1509). The development of the embryo sacs and pollen grains was associated with a disintegration of the neighbouring cells and assimilation by the former of the resultant unorganized living substance. Similar assimilation processes were observed also during and after fertilization. In the first case, mutual interaction occurred between the growing reproductive cells, and in the latter, the embryos assimilated the substance of the endosperm and the vegetative tissues of the ovules.

863 Sinjuhin, A. M.
(Outlines of the ontogenetic development of the cells at the growing point of barley).
Izv. Akad. Nauk SSSR (News Acad. Sci. USSR) 1952 : No. 5 : 33–35 [Russian].

Other methods of cell division than mitosis, in particular, intense fragmentation of nuclei and development from the fragments of normally functioning nuclei, were observed at the growing point of the six-rowed barley Červonec [Gold Coin].

864 Lettré, H.
Zur Wirkung von Atmungskatalysatoren auf die Zellteilung. **(The action of respiration catalysts on cell division).**
Naturwissenschaften 1952 : **39** : 483–84.

Respiration ceases during cell division, and addition of pyocyanin, which increases respiration, to the culture medium caused an almost complete suspension of division in tissue cultures.

865 Jacobson, W. and Webb, M.
Nucleoproteins and cell division.
Endeavour 1952 : **11** : 200–07.

The distribution of ribonucleic acid and desoxyribonucleic acid during cell division is reviewed. Reference is made to the discovery that 5-formyl-tetrahydro-folic acid, the *Leuconostoc citrovorum* factor, appears to be essential for chromosome splitting at anaphase.

866 Zinecker-Brauer, I.
Über das Mitoseverhalten in den Wurzelspitzen von *Vicia faba*. I. Die Gesamtvariabilität der Mitosehäufigkeit. **(On mitotic behaviour in the root tips of *Vicia Faba*. I. Total variability of the frequency of mitosis).**
Chromosoma 1952 : **5** : 317–40.

As a basis for a proposed investigation of the influence of endogenous and exogenous factors on the frequency of mitosis, data are analysed relating to the frequency distribution in over 1,640,000 cells in 8200 *V. Faba* root tips, as reckoned for each hour of the day and for each day of an extended period.

It appears that cell division exhibits an endogenous rhythm which in the individual cell is affected by superimposed factors promoting or inhibiting division.

For the first time in botanical material resting nuclei and antephase nuclei have been distinguished by means of statistical methods (cf. *PBA*, Vol. XXI, Absts. 1539 and 1540).

867 Wilson, G. B., Tsou, T. and Hyypio, P.
Variations in mitosis.
Genetics 1952 : **37** : p. 636. (Abst.).

With a view to elucidating the forces involved in chromosome movement an attempt is being made to systematize deviations from "normal" mitotic behaviour, in terms of variability in spindle action. The material investigated consisted chiefly of *Allium* root tips treated with organic compounds, particularly colchicine and cyclochlorohexane. All the deviations detected also occur in untreated tissues, either regularly or sporadically, depending upon the tissue and type of deviation.

868 Guttman, R.
An interpretation of some mitotic irregularities using the Poisson distribution.
Amer. J. Bot. 1952 : **39** : 528–34.

Statistical analyses of the effect of colchicine and acenaphthene on the relative duration of mitotic stages in root tips of *Allium Cepa* have shown that neither chemical prevents the onset of prophase. Both chemicals double the length of time necessary for a complete mitotic cycle, the duration of metaphase being four times as long as in the controls; following metaphase, 85% of cells proceeded to the interphase without passing through either anaphase or telophase. On assuming the interphasic state each cell appeared to have the same chance as before of undergoing a normal mitotic division. These data support the results of purely qualitative studies, in which fewer prophase, anaphase and telophase configurations and an increased number of metaphases were observed.

Although l-amidone was previously thought to induce partial c-mitosis, statistical analysis has shown that this chemical reacts quite differently from colchicine, causing an increase in the duration of interphase, a much less frequent omission of anaphase and telophase and a marked decrease in the number of metaphases.

869 WADA, B.
The effect of chemicals on mitosis studied in *Tradescantia* cells *in vivo.* I. *p*-acetylaminotropolone.
Cytologia, Tokyo 1952 : **17** : 14–34.

Several types of chromosomal aberrations, including bridges and fragments, were observed at telophase when mitosis was initiated in living staminal hair cells of *Tradescantia*, subsequent to treatment with 0·00005 and 0·000005 M solutions of *p*-acetylaminotropolone (AAT). Bridges and fragments appeared in the middle of the spindle at anaphase, but began to move centrifugally before the cell plate was seen. With the onset of telophase, the cell plate developed rapidly; bridges and fragments were pushed towards the periphery of the phragmoplast and were often arrested and bisected. Distal ends of very long fragments projecting into the phragmoplast were also torn off by the growing nuclear membrane. These observations support the theory that changes in submicroscopic structure are responsible for the development of both cell plate and nuclear membrane (cf. *PBA*, Vol. XXI, Abst. 2343); furthermore, such rigidity, capable of breaking fragments, suggests a highly organized molecular lattice.

At higher concentrations of AAT, the initiation of mitosis was suppressed and dividing nuclei developed abnormalities, followed by coagulation and death.

870 HAWTHORNE, M. E.
The cytological effects of the antibiotic Acti-dione.
Diss. Abstr. 1952 : **12** (Publ. No. 3077) : p. 8.

Onion root tips were treated with 1 to 80 ppm. solutions of Acti-dione for 12 hours and also for a 15 minute period. The frequencies of aberrations varied in the different stages of mitosis, the highest percentages occurring in prophase and the lowest in anaphase. The data suggested that the thresholds of toxicity and the production of abnormalities in the division figures may be close, between 1 and 5 ppm. and between 0 and 15 minutes. Apparently Acti-dione behaves in a manner similar to that of a slow fixing agent with a differential effect upon the nuclear and cytoplasmic constituents of the cells; as the degree of fixation increased, the different types of abnormalities appeared. Assuming this analysis of the observed breakdown in mitosis to be correct, the following hypotheses concerning normal mitotic processes are put forward: (1) a gradual formation of the spindle; (2) the cytoplasmic origin of at least some parts of the spindle; and (3) the possibility of the origin of anaphase movements from some mechanisms arising within the chromatids themselves. (Cf. Abst. 871).

871 HAWTHORNE, M. E. and WILSON, G. B.
The cytological effects of the antibiotic Acti-dione.
Cytologia, Tokyo 1952 : **17** : 71–85.

A quantitative basis has been established for a comparison of the effects of 1–80 ppm. Acti-dione on onion root tip meristems with the effects of other antibiotics (cf. *PBA*, Vol. XXI, Abst. 1558). After treatment with Acti-dione for 15 mins. or during continuous exposure for 12 hrs., the number of dividing nuclei, relative frequencies of different stages of mitosis and rate of increase of disorganized configurations were estimated from Feulgen squashes, by examining the cells on comparable axes across each slide. The most sensitive index appears to be the frequency of different mitotic stages; deviation from normal depends on concentration. Other aberrations studied were correlated with time rather than concentration.

Most of the deviations described lead to unbalanced daughter nuclei, which are incapable of further division; however, it is pointed out that mitotic abnormalities are potentially important sources of cytological and genetical variability.

872 WOODS, P. S. and DUNCAN, R. E.
Cytological effects of benzimidazole and 5-aminouracil.
Genetics 1952 : **37** : 636–37. (Abst.).

Onion roots were immersed up to 48 hours in aqueous solutions of 150, 300 or 600 ppm. of benzimidazole and 31, 63, 125, 250 or 500 ppm. of 5-aminouracil at pH 5·8 ± ·3, and kept in the dark at 22 ± ·5°C. Within 24 hours both chemicals produced a decrease in the mitotic index, the higher the concentration the lower the index. By 24 hours mitotic activity ceased in roots immersed in 600 ppm. benzimidazole. At higher concentrations, this compound induced a somewhat greater contraction of the chromosomes than normal, but no irregularities in spindle function or chromosome disjunction. Treatment with 5-aminouracil resulted in Feulgen 1–1 negative regions but did not destroy the unity of chromosomes. These regions became elongated in anaphase; one or more micronuclei resulted from each anaphase of this type. Photometric determinations of the desoxypentose nucleic acid (DNA) content of energic nuclei were made after 24 hours. The relative frequencies of 2C and 4C nuclei in the controls and roots treated with benzimidazole did not differ greatly. Roots treated with 5-aminouracil, however, contained four nuclei with the 4C amount. Apparently this substance causes a cessation of mitosis by interference with the accumulation of DNA.

873 Weyers, W. H. and Reusch, J. D. H.
A note on the cytology of *Ornithogalum virens* Lindl.
S. Afr. J. Sci. 1952 : **49** : 21–24.

Mitosis and meiosis in *O. virens* ($2n = 6$) are described. The species is regarded as ideal for the demonstration of basic cytological processes. The six large chromosomes, with subterminal centromeres, pair normally, and the bivalents each form two chiasmata at meiotic prophase. At diakinesis differential terminalization of the chiasmata results in marked lagging. Where the homologous chromosomes are associated interstitially, their behaviour in the presence of comparate and disparate chiasmata is well-defined.

874 Hiraoka, T.
Observational and experimental studies of meiosis with special reference to the bouquet stage. VIII. An experimental study on the cell and nuclear conditions in the bouquet stage.
Cytologia, Tokyo 1952 : **16** : 335–40.

When intact spore and pollen mother cells of *Cyrtomium*, *Psilotum* and *Trillium* are at the bouquet stage (cf. *PBA*, Vol. XXI, Abst. 79), dehydration of the nucleus with a hypertonic sucrose solution causes chromosome contraction and formation of a synizetic mass attached to the nuclear membrane where the bouquet base is situated. During plasmolysis of *Psilotum* and *Physcomitrium*, the plasmolysed protoplast also adheres to the cell membrane in the area adjacent to the region of bouquet attachment on the nuclear membrane. It has been suggested that the region of adherence is the point of origin from which the cell membrane developed in the preceding mitosis.

875 Hiraoka, T.
Observational and experimental studies of meiosis with special reference to the bouquet stage. IX. Suction force and permeability to urea of spore mother cells undergoing meiosis.
Cytologia, Tokyo 1952 : **17** : 6–13.

No variation was found in the permeability of pollen mother cells and microspores of *Cyrtomium* to either sucrose or urea during different stages of meiosis, contrary to the results obtained by Stern with *Trillium* (cf. *PBA*, Vol. XVIII, Abst. 2062). Evidence is, however, presented to show that the osmotic pressure of pollen mother cells increases with the onset of the bouquet phase (cf. *PBA*, Vol. XXI, Abst. 79).

876 Kirby-Smith, J. S. and Daniels, D. S.
The relative effects of X rays, γ rays and β rays on *Tradescantia* pollen.
Genetics 1952 : **37** : p. 596. (Abst.).

After irradiation the pollen grains were cultured on a lactose-agar medium with colchicine, and the chromosomal aberrations were analysed in pollen tube division. In every instance the X ray treatment was found to be approximately twice as effective in inducing aberrations as the same dose expressed in equivalent röntgens of high energy γ or β rays. These results indicate that the coefficients of aberration production in *Tradescantia* are not constant over the wavelength range from medium energy X rays to high energy γ rays, as has been previously supposed. At all wave lengths studied the frequency of isochromatid breaks increased with dosage more rapidly than would be expected from the generally assumed linear relation.

877 Yost, H. T. (Jun.).
The effect of intensity of infrared on X-ray induced chromosome aberrations in *Tradescantia*.
Genetics 1952 : **37** : 457–68.

An analysis was made of the cytological effects of infrared used as a supplementary treatment of inflorescences immediately before or after X irradiation. The main conclusions reached were as follows: (1) the relationship between dosage of infrared in either supplementary treatment and percentage increase in chromosome aberrations is nonlinear; (2) a definite threshold value and maximum exist for the infrared effect; (3) a reduced intensity of infrared applied as a posttreatment causes a lower number of aberrations; and (4) when the infrared is given as a pretreatment a lowered intensity of infrared has no effect on the number of aberrations recovered. The view is expressed that the hypothesis of the induction of activated stable states in the chromosomes can be applied not only to *Tradescantia*, but also to *Drosophila*, to explain the combined action of infrared and X rays (cf. Abst. 878).

878 Swanson, C. P. and Yost, H. T. (Jun.).
The induction of activated, stable states in the chromosomes of *Tradescantia* by infra-red and X-rays.
Proc. Nat. Acad. Sci., Wash. 1951 : **37** : 796–802.

All categories of chromosome aberrations induced by exposing inflorescences of *Tradescantia* to infrared followed by X radiation were significantly increased compared with those obtained with X ray treatment only. The frequency of irregularities induced by a combined treatment in the order infrared, temperature shock of 48° C for 30 seconds and X rays, showed no significant rise. In another experiment X ray treatment followed by infrared did not produce an increase in the frequency of isochromatid deletions compared with the X ray control; it resulted however in higher frequencies of chromatid deletions and exchanges. When the temperature shock was interposed between the X ray and infrared exposures, the frequencies of isochromatid and chromatid deletions were unaffected and significantly lowered, respectively, and exchanges occurred on a level comparable with that induced by X rays only. It is suggested that both infrared and X rays induce activated, stable states in the chromosomes. The states produced by the two kinds of radiation are however dissimilar, either in energy levels attained or in the pathways of reaction subsequently followed, since infrared, applied as a posttreatment, raises the X ray-induced states to the level of primary breaks, but does not have this effect upon states previously induced by infrared. High temperature prevents the expression of the activated states produced by either infrared or X rays. Preliminary data have further indicated that the infrared effect cannot be obtained if the inflorescences are subjected to this radiation at temperatures of 23° C and above, but that at 18° C and lower the effect is pronounced.

879 Oehlkers, F.
Weitere Versuche zur Mutationsauslösung durch Chemikalien. (**Further researches on the induction of mutations with chemicals**).
Biol Zbl. 1946 : **65** : 176–86.

Investigations are reported on the induction of chromosome aberrations in the flowers of *Oenothera* by various concentrations of ethyl urethane + KCl absorbed in the transpiration stream. Permanent rearrangements were induced in the resting stage or early stages of meiosis. At later stages, the effects produced resembled the primary effects of X irradiation. The duration of the treatment was of no consequence.

880 Yakar, N.
Cytochemical studies on pycnotic root-tip cells.
Bot. Gaz. 1952 : **114** : 72–79.

The cytological effects of colchicine, caffeine, hydroquinone, pyrogallol, pyrocatechol, 8-hydroxyquinoline and *p*-aminodimethylaniline monohydrochloride upon root tip cells of *Allium Cepa* and *Lilium tigrinum* are described. Used for short periods and in low concentrations, the chemicals induced chromosomal aberrations and mitotic disturbances. With longer periods and higher concentrations, they caused pycnosis. In general, the pycnotic nuclei were characterized by shrinkage, intense, uniform staining, and loss of individuality of the chromosomes. With pyronin-methyl green staining, the chromatin of these cells appeared violet, and pools of red-staining material in the nucleoli and round the nuclei and condensed chromosomes were observed. The results of cytochemical analysis suggested that the violet colour resulted from depolymerization of desoxyribonucleic acid, and that the red-staining material consisted of both ribonucleic acid and protein.

881 Yakar, N.
Mitotic disturbances caused by chloranil.
Amer. J. Bot. 1952 : **39** : 540–46.

Cytological examination of deformed seedlings of *Vicia Faba* grown from seed dusted with a commercial fungicide containing chloranil (tetrachloro-p-benzoquinone) revealed numerous mitotic abnormalities, including spindle inhibition, multipolar spindles, bridges, fragmentation, lagging and, occasionally, giant nuclei or complete nuclear disintegration. Similar abnormalities were produced in root tip cells of *Allium Cepa* treated with a suspension of chloranil, and suspensions and filtrates of the commercial fungicide. Many more onion cells, however, had pycnotic nuclei; desoxyribonucleic acid from these shrunken nuclei was detected in the cytoplasm. The possibility that chloranil may be used to induce polyploidy by suppression of the spindle is briefly discussed.

882 RAY-CHAUDHURI, S. P. and SARKAR, I.
Frequency of dicentric bridges in meiosis in the grasshopper *Gesonia punctifrons*, produced by different dosages of X-rays.
Science 1952 : **116** : 479–82.

The percentage of anaphase I bridges in meiosis was directly proportional to dose of X irradiation; it is suggested that single breaks in chromosomes, before their division into chromatids, and sister reunions were probably involved. The frequency of bridges remained constant up to a period of 148 hours after treatment; the long delay in restitution is of particular interest in view of the recent controversy on time of reunion after breakage (cf. *PBA*, Vol. XXII, Abst. 2446).

883 RILEY, H. P.
Preliminary report on the effect of certain chemicals on radiation damage to chromosomes.
Genetics 1952 : **37** : 618–19. (Abst.).

Onion roots 1 to 3 cm. long were immersed for 30 minutes in solutions containing different concentrations of sodium hydrosulphite or 2, 3 dimercaptopropanol. They were then removed, and subjected to γ radiation in air. The roots were returned to the solution for 10 minutes, and were finally transferred to water for 3 or 4 days before slide preparation. With 240 r., frequencies of 0·083 interchanges and 0·147 deletions per cell were obtained for control roots in water. Comparable frequencies occurred in roots treated with the same dose of X rays combined with concentrations of ·00002 to ·0000002 M of either chemical; the aberration frequency was however reduced to about one-half in stronger solutions (·00002–·02 M). A dose of 420 r. practically inhibited mitosis in the roots in water and in ·0002 M sodium hydrosulphite, but in roots treated with ·02 and ·002 M sodium hydrosulphite before and after irradiation about 1% of the cells continued to divide.

884 LOVELACE, R.
The effects of pre- and posttreatment with ultraviolet radiation on the frequency of gamma-ray-induced aberrations in *Tradescantia* chromosomes.
Genetics 1952 : **37** : 602–03. (Abst.).

Pretreatment of growing pollen tubes with ultraviolet radiation (2600–3600Å) resulted in a higher frequency of isochromatid aberrations and lower frequency of exchanges, in comparison with the results from γ ray treatment alone. The modification of the frequencies of γ-ray-induced aberrations by ultraviolet light was found to be dependent on the wave length and dosage of the ultraviolet and on the interval of time between the two kinds of irradiation.

885 CONGER, A. D. and FAIRCHILD, L. M.
Breakage of chromosomes by oxygen.
Genetics 1952 : **37** : p. 575. (Abst.).

Investigations have been carried out on chromosome breakage induced by exposure of flower buds and dry pollen grains of *Tradescantia* to O_2 concentrations greater than those in air. The aberrations are indistinguishable from those caused by ionizing radiations. Oxygen treatment of the flower buds has broken chromosomes in the prophase and resting stage of mitosis and meiosis. In the case of dry pollen grains, the quantitative relationships between breakage and O_2 concentration, pressure, time of exposure, temperature, cellular moisture content and ozone concentration have been determined; some qualitative aspects have also been studied. The data have revealed that breakage is caused by a physiological response of the cell itself to increased O_2 concentration, and have confirmed the view that oxygen induces breakage by accelerating an oxidative enzyme system, via the production of the reactive groups — OH, — O_2H and possibly H_2O_2.

886 SPARROW, A. H., POND, V. and SPARROW, R. C.
Distribution and behavior of supernumerary chromosomes during microsporogenesis in a population of *Trillium erectum* L.
Amer. Nat. 1952 : **86** : 277–92.

Of 237 plants of *T. erectum* ($2n = 10$) from Hump Mountain, NC, 18·6% contained one to four small supernumeraries, which showed the following characteristics: similarity in size; staining reactions identical with those of normal chromosomes; subterminal or median centromere; a tendency to pair with each other; a low amount of elimination during microsporogenesis; and among different plants variable behaviour with respect to lagging and subsequent loss. The supernumeraries were not associated with any morphological effect. Collections of the same species from the north-east of the United States and from adjacent areas in Canada have so far contained no supernumeraries.

887 MECHELKE, F.
Die Enststehung der polyploiden Zellkerne des Antherentapetums bei *Antirrhinum majus* L. (**The origin of the polyploid cell nuclei of the anther tapetum in *A. majus* L.**).
Chromosoma 1952 : **5** : 246–95.

The caryological processes in the differentiation of the tapetum in *A. majus* include (1) inhibition of both cell and nuclear divisions, (2) internal division of chromosomes and (3) in some instances, nuclear fusion. The resulting formation of multinuclear cells and polyploid nuclei is discussed with special reference to prevalent misinterpretations of the endomitosis hypothesis.

888 RÜDIGER, W.
Über die Beziehungen des Längen-Breiten-Index der Zellen und Organe bei Gigaspflanzen und ihren kleinzelligen Ausgangsformen. (**On the relationships of the length-breadth index of the cells and organs in gigas plants and the small-celled forms from which they are derived**).
Ber. dtsch. bot. Ges. 1952 : 65 : 239–45.

The length/breadth index of cells and organs in (1) a series of polyploid and diploid gigas plant forms and (2) the corresponding series of small-celled forms was determined in species of *Raphanus, Malva, Primula, Kalanchoe, Linum, Lycopersicon, Apium, Triticum, Secale* and some other plants. The gigas forms invariably showed a lower index for both organs and cells than the small-celled forms. The change in organ shape in the gigas form would therefore appear to be correlated with the change in the length/breadth index of the cells; and the change in cell shape alone may be the cause of the change in organ shape.

A similar correlation may well exist in races of wild plants, and cell shape may prove to be a significant factor in evolution (cf. *PBA*, Vol. XX, Abst. 105, Vol. XXI, Abst. 2360 and Vol. XXIII, Abst. 83).

889 CORNIL, L., POURSINES, Y. and OLLIVIER, H.
Modifications de la structure des noyaux et des cinèses obtenues par le venin d'abeille sur les cellules méristématiques de la racine de blé. (**Modifications in nuclear structure and in cinesis obtained by bee venom applied to the meristematic cells of the wheat root**).
CR Soc. Biol., Paris 1944 : **138** : 623–24.

Morphological changes in the resting nuclei and some mitotic disturbance were observed.

890 MANGENOT, G. and CARPENTIER, S.
Sur les effets mitoclasiques de la caféine et de la théophylline. (**On the mitoclastic effects of caffeine and theophylline**).
CR Soc. Biol., Paris 1944 : **138** : 232–33.

The c-mitotic action of the above two substances, as revealed in treated meristems of the onion or wheat, is characterized by the appearance of numerous binucleate cells and of hemicinetic configurations.

891 GAVAUDAN, P., POUSSEL, H. and DODÉ, M.
Comparaison du pouvoir mito-inhibiteur des substances de la série aromatique en fonction de l'activité thermodynamique de leurs solutions. (**Comparison of the mitoinhibitory power of aromatic substances in terms of the thermodynamic activity of their solutions**).
CR Soc. Biol., Paris 1944 : **138** : 267–68.

A comparison between the thermodynamic activities of solutions of a series of c-mitotic substances has shown that these fall into two classes: (1) substances such as benzene and acenaphthene, whose c-mitotic activity is believed to derive from their physical properties; and (2) substances such as aniline, phenol, colchicine and hexanitrodiphenylamine, which presumably act in some other way.

892 MANGENOT, G. and CARPENTIER, S.
Le syndrome mitoclasique. (**The mitoclastic syndrome**).
CR Soc. Biol., Paris 1944 : **138** : 105–07.

The three degrees of c-mitosis recognized by Gavaudan (cf. Abst. 86) are criticized as an oversimplification. It is pointed out, in particular, that (1) the term merostathmocinesis covers a considerable range of phenomena, (2) oblique mitotic spindles occur in normal meristems, and (3) other effects such as chromosome contraction, pycnosis and amitosis may characterize the c-mitotic action of some reagents.

893 Gavaudan, P. and Poussel, H.
Sur la théorie narcotique de la mito-inhibition; valeur de l'hypothèse lipoïdique dans la série benzénique. (**On the narcosis theory of mitotic inhibition; value of the lipoid hypothesis in respect of the benzene series**).
CR Soc. Biol., Paris 1944 : **138** : 246–47.

Although the theory of Levan and Östergren that c-mitotic action is inversely related to hydrosolubility holds for a number of benzene derivatives (cf. *PBA*, Vol. XIII, Abst. 1153), it does not hold for phenol or aniline.

894 Mangenot, G. and Carpentier, S.
Le plomb et le mercure, poisons mitoclasiques. (**Lead and mercury as mitoclastic poisons**).
CR Soc. Biol., Paris 1945 : **139** : 268–70.

Mitoclastic effects induced in the onion, wheat and pea by diethyl mercury, diphenyl mercury, mercuric chloride and lead salts are described.

895 Tanaka, N. and Satô, S.
Effects of streptomycin on the mitotic cells of *Tradescantia paludosa*.
Cytologia, Tokyo 1952 : **17** : 124–33.

Data concerning the action of aqueous solutions of 25–1000 ppm. streptomycin sulphate on root meristems of *T. paludosa* for 3–72 hrs. show that such aberrations as contraction and stickiness of the chromosomes, fragments, bridges, reductional groupings, c-mitosis, micronuclei and inhibition of cell wall formation are more readily caused by streptomycin than was formerly supposed (cf. *PBA*, Vol. XXI, Abst. 1558 and Vol. XXII, Abst. 1622). The results suggest that streptomycin may induce major translocations and polyploidy as well as minor genic alterations.

896 D'Amato, F.
Does meso-inositol inhibit the colchicine effect in the roots of *Allium Cepa*?
Arch. Int. Pharmacodyn. 1952 : **89** : 409–14.

From his own experiments on onion roots and from the examination of the results reported by other investigators the author concludes that meso-inositol is unable to counteract the c-mitotic and c-tumour effects of either colchicine or Gammexane.

897 Schwanitz, F.
Untersuchungen an polyploiden Pflanzen. XIV. Steigerung der Blütenproduktion durch Polyploidie bei *Malva silvestris* L. ssp. *mauritiana* Thell. und bei *Eschscholtzia californica* Cham. (**Investigations on polyploid plants. XIV. Increase of flower production by polyploidy in *M. silvestris* L. ssp. *mauritiana* Thell. and in *E. californica* Cham.**).
Züchter 1952 : **22** : 338–41.

Twenty tetraploid plants of the former species produced 29,013 flowers in a flowering season compared with 16,923 in the diploid; the corresponding figures for the other species were 2689 against 1338. The flowers of the tetraploid plants were also heavier, and the leaves, in the axils of which the flowers are borne, much larger. It is further pointed out that the two species concerned are to all intents and purposes wild forms, which have not yet reached their floral optimum. In both cases the increase in flower production is of practical value, the one species being a medicinal plant and the other an ornamental flower.

898 Gessner, F.
Die Entstehung der Landflora und die phylogenetische Gametophytereduktion. (**The origin of the land flora and the phylogenetical reduction of the gametophyte**).
Biol. Zbl. 1948 : **67** : 213–22.

The prevalence of the diploid phase in higher plants is attributed to the superior adaptability of two genomes over one, comparable to the superior adaptability of polyploids over diploids under severe climatic conditions.

899 Schwanitz, F.
Einige kritische Bemerkungen zur Methode der Bestimmung der Polyploidie durch Messung der Pollen- und Spaltöffnungsgrösse. (**Some critical remarks on the method of detecting polyploidy by measuring the size of the pollen and stomata**).
Züchter 1952 : **22** : 273–75.

Pollen from plants that have just begun to flower is considerably larger than pollen from plants that have been flowering for some time. Also, the guard cells of leaves formed at an early stage are large while those of leaves formed later are small. These observations are based on examination of species of *Malva*, *Digitalis*, *Sambucus*, *Symphoricarpus*, *Verbascum*, *Tropaeolum* and *Linum*. *Helianthus annuus* proved an exception as regards size of the stomata.

900 EHRENSBERGER, R.
Versuche zur Auslösung von Haploidie bei Blütenpflanzen. (**Researches on the induction of haploidy in flowering plants**).
Biol. Zbl. 1948 : **67** : 537–46.

Experiments on the induction of haploidy by X irradiation of the sporophytes of *Gasteria* spp. and *Antirrhinum majus* are reported. Maternal haploids and diploids were both obtained after the application of irradiated pollen. Paternal haploids were secured after pollination of X-irradiated egg cells. Parthenogenetic diploids were observed after the application of X-irradiated tetraploid pollen to a tetraploid strain of *A. majus*.

901 VON STOSCH, H. A.
Die Verwendung von Chloralhydrat oder Phenol zur Aufhellung und von Phenol-Balsam als Einschlussmittel für Essigkarminpräparate. (**The use of chloralhydrate or phenol for clearing and of phenol-balsam as a sealing agent for acetocarmine preparations**).
Züchter 1952 : **22** : 269–72.

Details are given of how the colour of cytological preparations stained with acetocarmine can be cleared in many cases by immersion in chloral hydrate or phenol. Preparations in phenol can easily be made permanent by ringing with a phenol-resin mixture.

902 MARKS, G. E.
A controllable carmine technique for plants with small chromosomes.
Stain Tech. 1952 : **27** : 333–36.

Anthers of plants with small chromosomes, e.g. *Brassica* and *Capsicum*, are fixed for 12 or more hours at 0–3° C in 1 part saturated solution of ferric acetate in glacial acetic acid and 3 parts absolute alcohol. They are transferred to a mordanting solution composed of 3 parts saturated solution of ferric acetate in 45% acetic acid, 2 parts 1% aqueous formalin and 5 parts 45% acetic acid, and kept in the solution 5–15 minutes at room temperature. The material is then rinsed in 45% acetic acid and macerated in Belling's acetocarmine.

*BOTANY

903 NUTTONSON, M. Y.
Ecological crop geography and field practices of the Ryukyu Islands, natural vegetation of the Ryukyus, and agro-climatic analogues in the northern hemisphere.
Amer. Inst. Crop Ecol. Wash. 1952 : Pp. 106.

A study of the various agroclimatic conditions prevailing in the different parts of the Ryukyu Islands and of their analogues in the northern hemisphere is added to the series of monographs on ecological crop geography in various countries, published with the main purpose of facilitating plant introduction (cf. *PBA*, Vol. XXII, Abst. 2466).

904 SCHILDER, F. A.
Probleme und Methoden der Biostatistik. I. (**Problems and methods of biostatistics. I.**).
Biol. Zbl. 1947 : **66** : 186–97.

The following procedure is recommended for determining the relative taxonomic affinity (A) between different races or other systematic categories. A series of n quantitatively varying characters is chosen, and these are measured for each sample, a range scale of 10 being used for each character. Two samples are now compared character by character, and the squares of the differences (d) of each character are summed. The affinity is then given by $A = \sqrt{\frac{\Sigma d^2}{n}}$. By repeating this procedure for each pair of samples, a chequerboard can be constructed showing the relative affinities of all the samples studied.

*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

905 GOODGAL, S. H.
Failure to obtain infra-red effects upon X-ray inactivated *E. coli*.
Genetics 1952 : **37** : 585–86. (Abst.).

The inactivation of *Escherichia coli* by X irradiation was not influenced by subsequent infrared treatment. One of the reasons suggested in explanation of this absence of effect is the possibility that X-ray-induced breakage and cellular inactivation are correlated processes.

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* General studies, see also individual crops.

906 Fried, P. J. and Lederberg, J.
Linkage in *E. coli* K-12.
Genetics 1952 : **37** : p. 582. (Abst.).

The distribution of unselected markers among selected prototroph recombinants has implied that the known loci in *Escherichia coli* strain K 12 belonged to one linkage group. Independent verification of the linkage between *Lac* and *M* has been sought in crosses which provided the opportunity of analysing the segregation of selected markers. In the progeny of M^-Lac^+ x M^+Lac^-, both M^+ and Lac^- predominated, but no evidence of linkage of these two factors was obtained. *M*, *S* and *Th* showed no correlation with *P*, *Lac* and *Vl*. Within each of these groups linkage was however detected. The preferential appearance of the alleles contributed by one parent has been found to be associated with the polarity of a factor for sex compatibility.

907 Berry, M. E. and Plough, H. H.
Transduction of multiple nutritional requirements in *Salmonella typhimurium*,
Genetics 1952 : **37** : p. 566. (Abst.).

In every test use was made of two strains having different multiple nutritional requirements. Each strain was grown in the sterile filtrate of the other strain; the progeny were then plated on media selective for new combinations of requirements. Not all strains are necessarily susceptible to the activity of a given filtrate. The requirements of one strain may be transduced singly, or in any combination of two, or more, to another susceptible strain (cf. Abst. 909). Not only the requirements as such, but also the wild type of alleles present in the donor strain may be transduced to the recipient strain. The nutritional transductions occurred independently and appeared to be assorted at random among the recipient cells.

908 Zinder, N. D. and Lederberg, J.
Genetic exchange in *Salmonella.*
J. Bact. 1952 : **64** : 679–99.

Results of an examination of the mechanism of genetic exchange in *S. typhimurium* are reviewed, giving particular attention to the phenomenon of transduction. In the presence of mildly deleterious agents, especially weakly lytic phages, a filterable agent capable of transferring hereditary characteristics from one strain to another is produced. Transduced characters are stable after many generations. No more than one characteristic has been transduced at a time in a single bacterium, the maximum frequency of transduction for any one character being 2×10^{-6}. Filtration through gradocol membranes indicates that the size of the filterable granules is about 0·1 micron. It has been suggested that the granules may constitute a heterogeneous population, each carrying a single gene or a small chromosomal fragment.

909 Berry, M. E., McCarthy, A. M. and Plough, H. H.
Transduction of multiple nutritional requirements in *Salmonella typhimurium.*
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 797–803.

The ability of a filtrable agent to transfer characteristics of one strain of *Salmonella* to another was first reported by Lederberg *et al.* (cf. Abst. 5). Their results have been confirmed in four separate instances, using independent X-ray-induced mutants of *S. typhimurium* and *S. schleissheim* requiring several growth substances. In each case new strains were isolated with multiple growth requirements representing different combinations of the nutritional requirements of both parent cultures. These results contrast with those of Lederberg *et al.* who found that the mutagenic properties of the filtrable agent were restricted to the transformation, or transduction, of one characteristic only in each strain.

910 Zinder, N. D. and Lederberg, J.
Gene transfer in *Salmonella.*
Genetics 1952 : **37** : p. 639. (Abst.).

A process of genetically unilateral transfer, termed transduction, has been detected in *S. typhimurium.* When this bacterium is attacked by lysogenic phages, it releases a filtrable agent (FA), which is able to transfer individual genetic characters from one bacterium to another. In experiments in which the FA donor and FA recipient differed in a number of traits, it was found that each character was subject to transduction, but each independently of the others. Characters such as nutritional requirements, fermentative abilities, drug resistance and antigenic properties have been transduced. The transferred character is stable both after vegetative reproduction and repeated transduction. The filtrable agent can be identified with a heat stable, chloroform-resistant particle having a diameter of about 0·1 micron. Unlike the transforming principles of *Pneumococcus* and *Hemophilus*, the agent is stable to desoxyribonuclease. Bacteriophages therefore appear to be passive carriers of genetically active material of bacteria. *S. typhimurium* FA is adsorbed by *Salmonella* strains having somatic antigen XII; some intertype transductions have been obtained, including antigenic transfers. Transduction may therefore play a role in the evolution of new genotypes.

911 Leupold, U. and Horowitz, N. H.
Über Temperaturmutanten bei *Escherichia coli* und ihre Bedeutung für die "ein Gen-ein Enzym"-Hypothese. (**Temperature mutants in *E. coli* and their significance for the "one gene: one enzyme" hypothesis**).
Z. indukt. Abstamm.- u. VererbLehre 1952 : **84** : 306–19.

By growing ultraviolet irradiated cultures, after suitable dilution, in a minimal medium for two days at 40° C, followed by five days at 25° C, a number of secondary colonies were found, consisting of mutants capable of developing at the lower temperature but not the higher. In this way 161 such temperature-sensitive mutants were obtained from irradiation of $1{\cdot}7 \times 10^9$ cells. Of these 161 mutants, 37 were incapable of developing at 40° C even on a complete *Neurospora* medium, on which the remaining 124 grew either normally or, in 9 cases, at a reduced rate. These 37 are thus "indispensable" mutants, which would not have been detected by the normal method of isolation on a complete medium. The proportion of such mutants is not sufficient however to explain the predominance, in experiments using the usual isolation technique, of mutants in which only one function is affected by any one gene.

912 Norman, A.
Radiation induced phenocopies in bacteria.
Genetics 1952 : **37** : p. 610. (Abst.).

Ultraviolet radiation induces the formation of phenocopies in *Aerobacter aerogenes* characterized by inability to grow in media containing as the sole carbon source acetate, citrate, succinate, lactose or rhamnose. Each of these compounds is an adaptive substrate for cultures grown in glucose; the radiation therefore probably blocks the adaptive mechanism in some way. This hypothesis is supported by the finding that the formation of phenocopies incapable of utilizing any one of these compounds can be suppressed by adapting the population to that compound prior to irradiation. Analysis of the survival curves suggests that the formation of phenocopies is a consequence of some alteration in the nucleus.

913 Lederberg, E. M.
Allelic relationships and reverse mutation in *Escherichia coli.*
Genetics 1952 : **37** : 469–83.

Recurrent Lac^- mutants could be grouped into four types with respect to rates of spontaneous reversion to Lac^+ at the locus Lac^-_1, the types being recognized on the basis of the average number of Lac^+ papillae per colony under standard conditions. In contrast to the mutable Lac^- strains, no reverse mutants were discovered in stable Lac^- strains, even after prolonged selection. The stable strains gave rise, however, to mimic reversions due to suppressors. The degree of mutability of Lac^-, it is suggested, depended primarily upon the locus itself, the four groups of mutants corresponding to four different alleles. Genotypic influences outside the locus, however, affected the apparent mutability of Lac^-_1, as indicated by the study of stable mutant substrains obtained by ultraviolet irradiation of unstable Lac^- strains. Among these secondary types, mutant genes modifying the formation of Lac^+ reversions in unstable Lac^- strains could be detected. By their phenotypic effects, such genes, e.g. Pur^- and Gal^-, lowered the selective value of potential Lac^+ mutants, but did not directly alter the intrinsic mutability of Lac^-_1. Exceptional Lac^+ prototrophs occurred in genetically marked Lac^- crosses; this is regarded as evidence that the locus consists of two components, designated *a* and *b*. Heterozygotes of the constitution a^-b^+/a^+b^- were phenotypically lactose-negative. Both in haploids and heterozygotes, a^+b^+ crossovers were phenotypically lactose-positive, indicating a "position effect."

914 Whitehead, H. A.
The protection of bacteria against radiation effects.
Science 1952 : **116** : 459–60.

A study was made of the protective action of sodium pyruvate, tryptophane, sodium thioglycollate, cysteine and glutathione against the lethal and mutagenic effects of ultraviolet light (2537 Å) upon *Escherichia coli* strain B/r. The experiments were performed in the dark in order to avoid photoreactivation phenomena; the mutant character used was changed colour response on mannitol-tetrazolium agar (cf. *PBA*, Vol. XXII, Abst. 82). The apparent protection afforded was due to physical absorption of the lethal and mutagenic rays by the particular test substance. It is emphasized that distinction between true physiological protection and simple physical absorption is necessary in studying the mechanism of the effects of radiation upon bacteria.

915 NOVICK, A. and SZILARD, L.
Anti-mutagens.
Nature, Lond. 1952 : **170** : 926–27.

Suitable concentrations of guanosine resulted in a practically complete suppression of the mutagenic action of the purine derivatives theophylline, caffeine, theobromine, paraxanthine and 8-azaguanine upon the tryptophane-requiring strain B/1t of *Escherichia coli.* The mutant character studied was resistance to phage T5. For a concentration of about 2 mgm./l. of guanosine, the rate of mutation induced by theophylline at a concentration of 150 mgm./l. fell by one-half. At concentrations of 5 mgm./l., two other normally occurring purine ribosides, adenosine and inosine, were strongly antimutagenic against theophylline. Guanosine also reduced the rate of spontaneous mutation to T5 resistance.

916 LESTER, G.
The β-galactosidase of lactose mutants of *Escherichia coli* K-12.
Arch. Biochem. 1952 : **40** : 390–401.

Experiments were carried out on the following lactose-nonfermenting (*Lac*⁻) mutants of strain K–12 of *E. coli*: Y–53, requiring threonine, leucine and vitamin B_1; Y–70, which differs from Y–53 in that it is less revertible at the *Lac*⁻ locus; Y–53–10, requiring vitamin B_1; and W–45, requiring methionine and biotin. The *Lac*⁻ loci of Y–53 and W–45 are nonallelic. The ability of the four mutants to utilize galactose and melibiose permits the examination of their production of β-galactosidase, since these sugars stimulate production of this enzyme in K–12. Mutants Y–53, Y–53–10 and Y–70 yield a fair amount of β-galactosidase; W–45 produces only minute quantities. Analysis of the β-galactosidase from Y–53–10 and W–45 revealed that their enzyme was identical with that produced by K–12, thus no gross changes in the active enzyme molecules occurred through mutation.

917 DAVIS, B. D. and MAAS, W. K.
Analysis of the biochemical mechanism of drug resistance in certain bacterial mutants.
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 775–85.

Following the observation that *p*-nitrobenzoic acid (PNB) interferes competitively with the utilization of two different metabolites, *p*-hydrobenzoic acid (POB) and *p*-aminobenzoic acid (PAB), it has been found that mutants of *Escherichia coli* with resistance to PNB plus PAB are not resistant to PNB plus POB, and *vice versa.* Since both types of resistance cannot be due to decreased penetration or increased destruction of PNB, various other possible mechanisms of resistance are discussed. Results of investigations are compatible with an enzyme alteration, leading to a decreased affinity for the metabolite and an even greater decrease in affinity for PNB. Increased resistance is also accompanied by a proportionate increase in the competitive ratio of various analogues to the metabolite.

918 MAAS, W. K. and DAVIS, B. D.
Production of an altered pantothenate-synthesizing enzyme by a temperature-sensitive mutant of *Escherichia coli.*
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 785–97.

Evidence is presented for the presence of a highly heat-labile enzyme responsible for catalyzing synthesis of pantothenate from β-alanine and pantoate in mutant 99–1t, which requires pantothenate for growth only above 30° C. This qualitative change supports Beadle's one gene: one enzyme hypothesis (cf. *PBA*, Vol. XVI, Abst. 1641). The possibility of qualitative alteration resulting from mutation was foreseen by Beadle, but this is the first time such a change has been recorded, quantitative changes being more common.

919 MATNEY, T. S. and MEFFERD, R. B. (JUN.).
Selection of microbial mutants resistant to high levels of pH sensitive antibiotics.
J. Bact. 1952 : **64** : p. 765.

A method of selection is described by which an organism, cultured with an antibiotic at a given pH, liberates acid from the substrate as it multiplies, thus lowering the pH to levels at which the antibiotic becomes increasingly active. A concomitant inhibition of nonresistant organisms and selection of resistant mutants is thus achieved.

920 DIENES, L. and ZAMECNIK, P. C.
Transformation of bacteria into L forms by amino acids.
J. Bact. 1952 : **64** : 770–71.

Glycine, methionine and phenylalanine consistently induced the production of L forms in *Salmonella typhimurium* and *Hemophilus influenzae.*

921 Lederberg, J., Cavalli, L. L. and Lederberg, E. M.
Sex compatibility in *Escherichia coli.*
Genetics 1952 : **37** : 720–30.

During genetical analyses of crosses involving *E. coli* K–12 and several mutant lines related to 58–161 and Y–10, all stocks with nonoverlapping nutritional requirements were assumed to be interfertile on a homothallic basis. It was, however, found that certain lines were self incompatible and also incompatible with W–1607 and W–1177; these lines were designated F^- mutants. While F^- x F^- combinations were sterile, F^- x F^+ and F^+ x F^+ were both fertile. No F^- offspring were obtained from F^- x F^+ progenies. In mixed cultures F^- cells readily became F^+, presumably by transduction, although no physical basis for transduction has yet been demonstrated, in contrast with *Salmonella* (cf. Abst. 908). The new F^+ cultures retained their transduced characteristic in subsequent generations and were as stable as the standard F^+ strains.

922 Fredericq, P. and Betz-Bareau.
Recombinants génétiques de souches marquées par résistance aux colicines. (**Genetical recombinants of cultures characterized by resistance to colicins**).
CR Soc. Biol., Paris 1951 : **145** : 1436–39.

From mixed cultures of mutants 58.161 and W.1177 of *Escherichia coli*, the first susceptible to the 8 colicins used in the experiment, and the second to all save colicin C, recombinants were obtained resistant to various combinations of colicins. In some cases intermediate degrees of susceptibility occurred in the recombinants.

923 Fredericq, P.
Apparition spontanée de mutants résistant aux colicines. (**Spontaneous appearance of mutants resistant to colicins**).
CR Soc. Biol., Paris 1948 : **142** : 853–55.

Mutation of strain E2 of *Escherichia coli* from susceptibility to resistance towards colicin V occurs independently of contact with the antibiotic.

924 Fredericq, P.
Indépendance des mutations intéressant les récepteurs d'antibiose chez les Enterobactériacées. (**Independence of mutations affecting the antibiotic receptors in the Enterobacteriaceae**).
CR Soc. Biol., Paris 1948 : **142** : 855–56.

Mutation of *Escherichia coli* cultures to resistance to different colicins occurs in respect of single colicins only, no connexion having been noted between mutants resistant to different colicins. Mutants resistant to colicins do not differ from the parent cultures in morphological, biochemical or serological characteristics.

925 Fredericq, P.
Indépendance des mutations chez *Shigella sonnei.* (**Independence of mutations in *S. sonnei***).
CR Soc. Biol., Paris 1948 : **142** : 1076–77.

No association could be detected between mutants involving resistance to specific colicins, nor was mutation to colicin resistance correlated with any evident morphological or biochemical changes.

926 Szybalski, W. and Bryson, V.
Genetic studies on microbial cross resistance to toxic agents. I. Cross resistance of *Escherichia coli* to fifteen antibiotics.
J. Bact. 1952 : **64** : 489–99.

Forms of the radiation-sensitive strain B and its radiation-resistant variant, B/r, were developed, each with resistance to one of 15 antibiotics. By testing the reaction of each strain to the remaining 14 antibiotics, with the gradient plate technique, degrees of cross resistance were established. Some strains were as sensitive to other antibiotics as their parent cultures. Others showed indirect development of resistance to additional antibiotics with which they had never been in contact. On the other hand collateral sensitivity was also noted, when increased resistance to one antibiotic was accompanied by added sensitivity to another. Interpretations of cross resistance are discussed. It is suggested that development of resistance may be governed by one or few mutations, resulting in several phenotypic changes related in origin but diverse in effect.

927 Lieb, M.
The production of lysogenic strains of bacteria.
Genetics 1952 : **37** : p. 601. (Abst.).

When cells of a sensitive, nonlysogenic strain are exposed to temperate phages, only some of them lyse after a brief latent period. The surviving cells include a number which give rise to colonies containing lysogenic cells, carrying the phage in a latent form and capable of transmitting the lysogenic trait to all their offspring. The study of individual clones derived from single γ-carrying cells of *Escherichia coli* K12S showed that cells giving rise to γ-carrying cells do not in addition produce cells undergoing lysis. Thus the formation of carried phage, resulting in lysogenicity, and the multiplication of phage leading to lysis appear to be mutually exclusive processes. The infecting phage which does not result in lysis acts, it is suggested, as a cytoplasmic particle immediately after infection, and later becomes attached to a permanent cell constituent, lysogenicity thus becoming a hereditary trait.

928 GOODWIN, T. W. and GRIFFITHS, L. A.
Studies in carotenogenesis. 5. Carotene production by various mutants of *Phycomyces blakesleeanus* and by *Phycomyces nitens.*
Biochem. J. 1952 : **52** : 499–501.

Growth, and lipid and carotene production were studied in morphological mutants of *Ph. Blakesleeanus*, the — strain of this species and *Ph. nitens* (+). Lipid production was the same in all strains. The strains were also similar in growth, except *Ph. nitens*, which showed a lower dry weight. All the — strains synthesized similar amounts of carotene. In the + strains, except *Ph. Blakesleeanus* mutant *gracilis*, total carotene synthesis was about one-half that in the — strains; the mutant *gracilis* + produced as much carotene as the normal — strain. The rate of carotene synthesis was similar, except in *gracilis* +, in which it was much more rapid. The mutants exhibited no differences in the type or relative amounts of the polyenes produced.

929 HEAGY, F. C. and ROPER, J. A.
Deoxyribonucleic acid content of haploid and diploid *Aspergillus* conidia.
Nature, Lond. 1952 : **170** : 713–14.

A ratio of 1 : 2 was obtained for the desoxyribonucleic acid content of conidia from haploid and diploid strains of *A. nidulans*.

930 GATTANI, M. L.
Production of better penicillin-producing strains by mutation induced by uranium nitrate.
Science 1952 : **116** : 596–97.

Two mutants of *Penicillium notatum* var. *chrysogenum* with a higher production of penicillin than the respective parent strains were induced by adding uranium nitrate to the nutrient media.

931 HUNGATE, F. P. and MANNELL, T. J.
Sulfur-35 as a mutagenic agent in *Neurospora.*
Genetics 1952 : **37** : 709–19.

A method is described for differentiating the mutagenic potentials of radioactive S^{35}. After growing *N. crassa* for 18 days on medium containing S^{35}, 15% of the conidia gave rise to biochemical mutants. β particles emitted by the S^{35} isotope are nonspecific mutagens; they were found to be responsible for 5–10% of the total mutants. The remaining mutants, which were qualitatively distinguishable, arose as the result of transmutation of S^{35} to Cl^{35}, changing the characteristics of genes normally containing S^{32}. The frequency of transmutation suggests that only a few genes were involved.

932 KEITT, G. W. and BOONE, D. M.
Additional gene pairs conditioning pathogenicity in *Venturia inaequalis.*
Phytopathology 1952 : **42** : p. 480. (Abst.).

Three more pairs of genes for pathogenicity of the wild type of *V. inaequalis* on apple have been found; the total number of gene pairs now known to condition this character is six. The three newly discovered gene pairs have been designated Haralson$_2$, Hyslop and Grimes Golden, respectively, according to the differential apple varieties. One allele of each pair conditions the production of typical sporulating lesions, and the other the formation of flecks with little or no sporulation. Only in the case of Haralson$_2$ was it possible to determine the position of the locus from data on second division segregation; the locus of the gene is situated approximately 12 cross-over units from the centromere.

933 PERKINS, D. D., BARRATT, R. W. and NEWMEYER, D. L.
Mapping functions for tetrads, and their application to *Neurospora.*
Genetics 1952 : **37** : 613–14. (Abst.).

Mapping functions corresponding to any specified interference intensity have been derived for second division segregation tetrads in *Neurospora*. The uncorrected maps and confidence limits worked out by Barratt *et al.* (cf. Abst. 934) have been modified to allow for multiple cross-overs.

934 BARRATT, R. W., NEWMEYER, D. L. and PERKINS, D. D.
Map construction from *Neurospora* tetrads, and the determination of confidence limits.
Genetics 1952 : **37** : 565–66. (Abst.).

Chromosome maps have been constructed from published and unpublished *Neurospora* tetrad data, and confidence limits have been estimated at the 5% level for second division segregation frequencies from 0 to 0·5.

935 Strauss, B. S.

Pleiotrophic effects of a mutation associated with low carboxylase activity in *Neurospora.*

Genetics 1952 : **37** : p. 631. (Abst.).

The mutant *car* shows low pyruvic carboxylase activity compared with the wild type (*car*+). When *car* is combined with an acetate-requiring, glucose-inhibited simple gene mutant *ac*, to form the double mutant *ac car*, the glucose inhibition characteristic of *ac* is suppressed. Crude and partially purified carboxylase preparations from *car*+ and *car* are indistinguishable kinetically. Carboxylase activities of both *car* and *car*+ are much higher with growth on sucrose or glucose than on xylose, but the increase in the activity of *car*+ is two to three times greater than in the carboxylase activity of *car*. Low tryptophane desmolase activity was associated with the mutation *car* in 10 complete asci tested. Lowered tryptophane desmolase and pyruvic carboxylase activity can be produced by growing *Neurospora* on a zinc deficient medium, but low zinc will not relieve the glucose inhibition of *ac acr*+ strains. The effect of the mutation on carboxylase activity is probably quantitative and indirect.

936 Giles, N. H. (Jun.).

The effect of a suppressor on allelic inositolless mutants.

Genetics 1952 : **37** : p. 584. (Abst.).

Investigations have been carried out on a reversion arising by suppressor mutation in ultraviolet irradiated microconidia of the [*Neurospora*?] inositolless mutant 37401. The suppressed mutant grows in absence of inositol, but at a much slower rate than inositol-independent cultures of the wild type or the usual reverse mutants. Its growth is markedly stimulated by addition of inositol. Combination of the suppressor with the wild type of allele at the inositolless locus results in a culture which, in flask tests, is considerably retarded in growth on minimal medium compared with the wild type, and which is not stimulated by inositol. The suppressor is independent of the inositolless locus and is specific for mutant 37401.

937 Markert, C. L.

Genetic control of glutathione synthesis in *Glomerella.*

Genetics 1952 : **37** : 603–04. (Abst.).

A peptide-requiring mutant (502–1) of *Glomerella* was induced by X radiation. A second peptide-requiring mutant (502–2) arose from 502–1 as a spontaneous sector. These two mutants grow on media supplemented by the tripeptide glutathione (glutamylcysteinylglycine) but not on any mixture of the constituent aminoacids, suggesting that the formation of a peptide bond has been affected by mutation. Both mutants grow only slightly on cysteinylglycine but well on a mixture of cysteinylglycine plus glutamylcysteine. Mutant 502–1 grows on glutamylcysteine alone, but 502–2 will not grow on this dipeptide. Genetical data were obtained suggesting that a chromosomal aberration is involved in the production of the two mutants.

938 Woodward, V. W., De Zeeuw, J. R. and Srb, A. M.

Selection of particular biochemical mutants in *Neurospora* from differentially germinated conidial filtrates.

Genetics 1952 : **37** : p. 637. (Abst.).

An outline is given of a technique involving filtration and selective plating, by means of which it is possible to separate particular mutants from various other genotypes. Conidia treated with a mutagen are incubated in a minimal medium under forced aeration. Under these conditions, germination of the wild type of conidia takes place. The resulting mycelium is removed at 12 hour intervals by aseptic filtration through two layers of cheesecloth. After 5–7 days, most of the spores which can germinate on minimal medium have been eliminated. The conidial filtrate is plated on minimal agar medium, supplemented with a specific substance for the selection of the desired biochemical mutants. Sorbose is added to the plates to induce colonization. Using this technique, arginineless mutants have been isolated.

939 Boone, D. M. and Keitt, G. W.

Induced biochemical mutants in *Venturia inaequalis.*

Phytopathology 1952 : **42** : p. 479. (Abst.).

Mutants with specific deficiencies for choline, inositol, purines, pyrimidines, histidine, arginine or reduced sulphur were induced by treatment with nitrogen mustard or ultraviolet light (1750 Å). A study was made of the inheritance of the deficiencies for choline, uracil, purines, histidine, arginine or reduced sulphur. Each deficiency appeared to be controlled by a single gene. The data indicated that some of the mutant genes can be located with reference to their respective centromeres on the basis of percentage of second division segregation.

940 FOX, A. S. and ZIEBUR, N. K.
An attempt to induce specific back-mutation at the inositolless locus in *Neurospora crassa* by means of antibodies.
Genetics 1952 : **37** : 581–82. (Abst.).

To test the possibility that antibodies are specific mutagens, back mutation of inositolless (i) to wild (i^+) has been studied in connexion with suitable immunological techniques. A homocaryotic i^+ stock and homocaryotic i stock were used to inject rabbits. Cross absorption, precipitin and microconidial agglutination tests of high-titred antisera failed to demonstrate antibodies specific to i or i^+. No reversions were detected in platings of antiserum-treated i microconidia on minimal medium. It is suggested that either antibodies are not mutagenic, or they are mutagenic but inactive in these particular experiments.

941 ATWOOD, K. C.
Different actions of ultraviolet and X rays revealed by heterokaryon methods.
Genetics 1952 : **37** : p. 564. (Abst.).

Experiments in which use is made of conidia from *Neurospora* heterocaryons having appropriate genetic markers are particularly valuable in elucidating the biological action of radiation or other agents. The survival, apparent proportion of homocaryotic cells and proportion of nuclei carrying recessive lethal mutations can be measured simultaneously. With all doses, the relative values of these variables after X ray treatment differ from those obtained with ultraviolet radiation. The most extreme difference occurs in the proportion of homocaryotic cells among the survivors. In the case of X rays this proportion rapidly increases with dose; with ultraviolet light it shows little change. Other types of experiments suggest that the effective damage caused by ultraviolet irradiation of the conidia is predominantly nuclear. If this is correct, the above-mentioned difference in proportion of homocaryotic cells can be explained as follows: the effect of ultraviolet radiation is reversible as a result of interaction between affected and unaffected nuclei, whereas the effect of X rays cannot be reversed in this manner.

942 HUEBSCHMAN, C.
A method for varying the average number of nuclei in the conidia of *Neurospora crassa.*
Mycologia 1952 : **44** : 599–604.

Using a wild strain and three biochemical mutants, it was possible to increase the average number of nuclei per conidium from 2·6 on minimal media to 6·2 on complete media. This significant effect due to the composition of the medium will be used to produce conidia with varying numbers of nuclei, in order to determine whether nuclear inactivation is responsible for the lethal effects of ultraviolet irradiation on conidia (cf. *PBA*, Vol. XXII, Abst. 1673).

943 HOROWITZ, N. H. and FLING, M.
Genetics of tyrosinase thermostability in *Neurospora.*
Genetics 1952 : **37** : p. 591. (Abst.).

Strains of the wild type have shown differences in the thermostability of the tyrosinase activity of crude and partially purified extracts. Extracts from thermolabile strains (TL) are half-inactivated in 4 minutes or a longer period, whereas in thermostabile (TS) strains half-inactivation occurs after 40 or more minutes. Data have been obtained suggesting that the enzymes of the two types are structurally different. Crosses of TS x TL have indicated that thermostability and thermolability are determined by alleles of a single gene, whose locus is at least 29 map units from the centromere.

944 GROSS, S. R.
Heterokaryosis between opposite mating types in *Neurospora crassa.*
Amer. J. Bot. 1952 : **39** : 574–77.

Using hyphal tip isolations of lysineless and pantothenicless mutants, heterocaryosis was observed between opposite mating types grown on minimal media. The abnormally slow and irregular growth rate of these heterocaryotic hyphae is assumed to be caused by alterations in the rate of synthesis of essential growth factors due to the presence of nuclei of both mating types in a common cytoplasm. Since specific associations of mating type alleles and other loci influence the ratio of nuclear types within the hyphae, it is pointed out that heterocaryons are not reliable material for the study of dominance.

945 MATHIESON, M. J.
Ascospore dimorphism and mating type in *Chromocrea spinulosa* (Fuckel) Petch n. comb.
Ann. Bot., Lond. 1952 : **16** : 449–66.

The asci of *Ch. spinulosa* contain four large and four small ascospores, each being two-celled;

the ascospores are arranged in the six patterns expected if spore size were controlled by a pair of alleles. The larger ascospores produce self fertile colonies, which give rise to asci also showing segregation for spore size. The smaller ascospores yield sterile colonies. Results from crosses between the wild type and radiation-induced mutants differing from the wild type in nature of mycelial growth or spore colour indicated that the difference in spore size is a pleiotropic expression of mating type and that heterothallism is controlled by a pair of alleles; the fertility of the colonies from large spores must therefore be the result of mutation in mating type. Heterocaryons are formed readily, irrespective of the original mating type of the two components. Using mutants affecting both mycelial characters and ascospore colour, it has been discovered that nuclei are able to migrate freely through the mycelium of another strain. After mutation in mating type, however, the mutant nuclei do not migrate before fusion or association with nuclei of the opposite mating type.

An ordered tetrad is formed in the ascus; eight bivalents appear to be present at metaphase I. In general the constitution of the asci in each perithecium is determined by a single primordial pair of nuclei. No evidence has been obtained of biased segregation for spore size and colour.

946 Hansen, H. N. and Snyder, W. C.
Inheritance of the sexes and compatibilities in fungi.
Phytopathology 1952 : **42** : 479–80. (Abst.).

In the homothallic, hermaphroditic fungus *Ceratostomella fimbriata* two self sterile mutants occur. One mutant produces perithecial elements and is designated female; the other produces no such elements and is designated male. The female can be fertilized by the normal self-fertile hermaphrodite and by the male mutant but cannot fertilize females or hermaphrodites. The male mutant can fertilize both females and hermaphrodites, but cannot be fertilized itself. The segregation data from various crosses indicate that the male and female types are each determined by a single factor, independently inherited. When both factors occur in the same thallus hermaphroditism results.

In the heterothallic, hermaphroditic fungus *Hypomyces Solani* f. *Cucurbitae*, the factors for compatibility have been found to be inherited independently of those for the female and male conditions.

947 Mitchell, M. B. and Mitchell, H. K.
A case of "maternal" inheritance in *Neurospora crassa.*
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 442–49.

Data are presented to show that a slow growing phenotype, designated poky, only appears among the progeny of normal x poky crosses when the poky parent produces the protoperithecia. The protoperithecial parent corresponds to the female parent, on the basis of contributing the greater part of the cytoplasm from which the ascospores develop; thus it is assumed that transmission of the poky characteristic occurs through the cytoplasm.

948 Thorne, R. S. W.
The problem of flocculence in brewery yeasts.
Wallerstein Labs Commun. 1952 : **15** : 201–211.

Results of investigations concerning the genetics of flocculence (cf. *PBA*, Vol. XXII, Abst. 956) are reviewed. It is emphasized that the three polymeric genes F_1, F_2 and F_1 readily mutate to the recessive condition, consequently the majority of stable strains are nonflocculent. The stability of a flocculent yeast, however, increases geometrically with the number of dominant alleles for flocculence, which may reach a maximum of six, viz. F_1F_1 F_2F_2 F_3F_3.

949 Lindegren, C. C. and Lindegren, G.
Proximity of genes controlling the fermentation of similar carbohydrates in *Saccharomyces.*
Nature, Lond. 1952 : **170** : 965–68.

The genes *MA*, *MZ* and *MG* controlling the hydrolysis of maltose, melezitose and α-methyl-glucoside, respectively, are situated on the same chromosome. A fourth gene, *SU*, for fermentation of sucrose and raffinose, has also been found to belong to the same linkage group. The high frequency of recombination among the four loci does not necessarily indicate that the absolute distances separating them are great. From the assumed proximity of the loci it is concluded that they have a common origin; it is suggested that the series arose through unequal crossing-over and mutation of duplications. Linkage has also been detected between *GA* (formerly *G*) for the transformation of galactose into a utilizable hexose and *ME* for the hydrolysis of melibiose into glucose and galactose. It is postulated that duplication of *GA* led to alteration of one *GA* gene to *ME*. *MA*, *MZ*, *MG*, *SU*, *GA* and *ME* are all considered to be enzyme-template genes.

950 JAMES, A. P.
An exceptionally frequent induced genetic change in yeast.
Genetics 1952 : **37** : 592–93. (Abst.).

Under the influence of ultraviolet radiation (2537Å) a galactose + strain of *Saccharomyces cerevisiae* readily mutates to galactose requirement. The change differs from the majority of induced genic mutations in the following ways: (1) the change occurs at a very high rate, affecting as many as 10% of the colonies from irradiated cells; (2) it is detectable in the diploid without breeding for homozygosity; (3) the ratio of whole colony to sectored mutants rises with increasing dose; (4) the instability is expressed for many generations in certain galactose + lines derived from irradiated cells; and (5) the likelihood of the occurrence of the induced change varies considerably in lines produced by selfing the original line, and this variability can be observed even after eight generations of inbreeding. It is suggested that the data so far obtained are compatible with the concept of mutation by loss or partial loss of a particular type of cytoplasmic particle.

951 CONSTANTIN, T.
Modulation et mutations chez *Saccharomyces cerevisiae*. (**Modulation and mutations in *S. cerevisiae***).
CR Soc. Biol., Paris 1949 : **143** : 1016–19.

By treatment with Styryl 430 or ultraviolet light, yeast cells of a morphologically different type, the S form, are obtained. The S form readily reverts to the normal type but gives rise to a significantly greater number of stable mutants than the normal type. The transformation of normal cells into the S form is termed a modulation.

952 CONSTANTIN, T.
Mutations en deux temps chez *Saccharomyces cerevisiae*. Apparition de formes nouvelles. (**Mutations in two stages in *S. cerevisiae*. Appearance of new forms**).
CR Soc. Biol., Paris 1950 : **144** : 1442–43.

A modulated form of yeast with a greater tendency to mutate than the normal form has been produced by the action of sodium nucleate (cf. Abst. 953).

953 CONSTANTIN, T.
Mode d'action du nucléinate de sodium sur la mutation de *Saccharomyces cerevisiae*. (**Mode of action of sodium nucleate with reference to mutation in *S. cerevisiae***).
CR Soc. Biol., Paris 1950 : **144** : 1443–45.

Modulation of yeast cells (cf. Abst. 952) is accompanied by an increase in nuclear size, presumably due to a disturbance in the normal nucleus-cytoplasm balance of ribose nucleoprotein.

954 PRAHLADA RAO, L. S. and SUBRAMANIAM, M. K.
Somatic chromosomal reduction in yeast.
Arch. Mikrobiol. 1952 : **17** : 160–65.

The majority of the cells in five-day-old cultures grown under anaerobic fermentative conditions, or in 24-hour-old cultures on agar slants, have been found to be endopolyploid. The endopolyploid cells are capable of giving rise to buds with the normal diploid complement of two chromosomes. This phenomenon is regarded as a type of somatic reduction by means of which the yeast strain can survive in an unfavourable environment wherein the population consists predominantly of endopolyploid cells of varying complexity. This case of somatic reduction, it is emphasized, is not comparable with that reported in *Culex* and some higher plants; nor can it be classified as polymitosis.

955 ROMAN, H.
Polyploidy and phenotypic ratios in *Saccharomyces*.
Genetics 1952 : **37** : p. 620. (Abst.).

Originally haploid clones of *Saccharomyces* develop into mixtures of haploid and diploid cells. The diploids within a clone are either heterozygous or homozygous for the mating type alleles. The heterozygotes, which have arisen as a result of mutation at the locus for mating type, sporulate readily and give 4-spored asci in which a 2 : 2 segregation of mating type alleles occurs. The homozygotes, which do not sporulate, mate with haploid and diploid cells of opposite mating type. If markers other than mating type are used, crosses between homozygous dominant and homozygous recessive diploids yield asci with ratios of 4 : 0, 3 : 1 and 2 : 2 for dominants : recessives. Crosses between heterozygous and homozygous recessive diploids produce asci with 2 : 2 and 1 : 3 segregations. Crosses between clones consisting of haploid-diploid mixtures sometimes give 0 : 4 asci; these have been found to be the result of sporulation of cells heterozygous for mating type, and present in the parental clones prior to the cross. Thus it has been possible to attribute the various ratios to polyploidy or to mutation at the locus for mating type. The triploids, unlike the diploids and tetraploids, are highly sterile. The evidence on sterility suggests that the haploid complement of the strains investigated consists of at least four chromosomes. The mating system in this material is largely heterothallic, but fusion of cells of the same mating type has occasionally occurred.

956 Pomper, S.
Isolation of triploid *Saccharomyces cerevisiae.*
Nature, Lond. 1952 : **170** : 892–93.

A diploid clone was isolated, which was homozygous for the recessive alleles determining adenine and uracil requirements, and heterozygous for mating type and for the genes involved in methionine and tryptophane synthesis. Haploid clones of both mating types (*a* and α), homozygous for the genes controlling methionine and tryptophane requirements, were each used for mass matings with the diploid. A few colonies were secured from both matings, by plating on agar containing carbohydrate, nitrogen, vitamins and buffer, but no adenine, uracil, methionine and tryptophane. This sporulation and mating behaviour supported the view that triploids had been produced. Tetraploids have also been isolated by an analogous procedure.

957 Lindegren, C. C. and Lindegren, G.
The tripartite nature of the MZ gene system in *Saccharomyces.*
Genetics 1952 : **37** : 601–02. (Abst.).

The multiple alleles of the *MZ* series differ in their control of the capacity to ferment sucrose, α-methyl glucoside and melezitose. A culture with allele *MZ* can adapt to maltose, turanose, sucrose, melezitose and α-methyl glucoside. The presence of MZ^a results in failure to adapt to α-methyl glucoside. A culture with MZ^b cannot adapt to melezitose; MZ^c causes failure in adaptation to both melezitose and α-methyl glucoside; with MZ^d only adaptation to maltose and turanose occurs. With all the alleles, the same enzyme is produced upon adaptation. Even an MZ^d culture can ferment all five sugars, after adaptation to maltose. Thus the gene system acts specifically in the elicitation of enzyme, but not specifically in the production of enzyme. It is inferred that the *MZ* gene system has three parts: a highly specific receptor controlling the reaction between the gene and eliciting substrate; (2) a non-specific effector controlling production of enzyme; and (3) a means of connexion between these two different sites.

958 Sussman, R. B.
An analysis of the phenomenon of "long term adaptation" in yeast.
Diss. Abstr. 1952 : **12** : No. 4016 : p. 563. (Abst.).

Analysis of the phenotypic changes occurring during slow adaptation of *Saccharomyces Chevalieri* to galactose fermentation indicated that only a small proportion of the initial population attained the ability to become adapted. The author agrees with Winge and Roberts (cf. *PBA*, Vol. XVIII, Abst. 2136) that, once transformed into a galactose fermenter, *S. Chevalieri* can synthesize the necessary enzyme at a normal rate. From the results of reversion experiments it is concluded that this ability to produce more enzyme depends upon an adaptive change in the cytoplasm.

959 Mundkur, B. D.
Long term adaptation to galactose by yeast.
Genetics 1952 : **37** : 484–99.

Fermentative behaviour and its genetic basis have been analysed in two different types of *Saccharomyces* haploids showing long term adaptation to galactose. Cultures of the first type, of composite genetic origin, ferment galactose after long and irregular delays, achieving adaptation by the occurrence, in the initially nonfermenting populations, of variant cells capable of rapid fermentation of galactose. These variants are mutants, as indicated by their inability to revert in the absence of substrate, and by the fact that, on outcrossing them with nonfermenter cells, asci yielding consistent Mendelian segregations of 2 : 2 for rapid fermenters (*G*) : nonfermenters (*g*) are obtained.

The second type, a culture of *S. Chevalieri*, consistently achieves long-term adaptation on the sixth or seventh day of contact with galactose, this behaviour depending upon the gene g_s for slow fermentation (cf. *PBA*, Vol. XXII, Abst. 1686). The initial period of quiescence prior to active gas release is due to a physiological state in which the galactozymase concentration is brought to functional levels. If transferred to a galactose-free medium, the long-term adapted clones undergo readaptation. Occasional stable, adapted, rapidly fermenting clones are found, however, which fail to revert to slowness in the absence of substrate. Genetic analyses have revealed that such exceptional clones originate as a result of mutation of g_s to *G*, combined with selection in the presence of galactose.

960 MITRA, K. K.
Physiological consequences of polyploidy in yeasts. I. Fermentation characteristics of a diploid brewery yeast and its autotetraploid.
Biochim. Biophys. Acta 1952 : **8** : 615–24.

A study was made of fermentation in a diploid strain of brewery bottom yeast and its acenaphthene-induced tetraploid (cf. *PBA*, Vol. XXII, Abst. 1691). Under a variety of conditions the tetraploid showed a 30% higher rate of fermentation than the diploid during the initial stages of fermentation; the final amounts of alcohol produced by the two strains were however identical. Data on sugar-alcohol balance indicated that the tetraploid possessed a slight superiority in fermentative efficiency. Duplication of the chromosome complement resulted in no change in sugar tolerance. It is suggested that induction of polyploidy in conjunction with hybridization might provide improved strains for industrial purposes.

961 JACKSON, E. L. and ROWELL, J. B.
Mutation and environmental selection of growth types in *Ustilago zeae.*
Phytopathology 1952 : **42** : p. 480. (Abst.).

Mycelial, sporidial and intermediate types occur in monosporidial haploid lines of *U. Zeae*. The growth type of the intermediates can be altered by mutation. Mutation can also cause changes in growth type, as shown by investigations on the mycelial line 17D4–C7. In liquid culture this line produces different kinds of sporidial and mycelial mutants; on solid media only mycelial mutants appear, since the sporidial aberrants tend to be obscured. Sporidial and mycelial mutants may in turn produce further mutants of both the mycelial and sporidial types.

962 LU, S. I., STAKMAN, E. C. and ROWELL, J. B.
The behavior of mutable black lines of *Ustilago zeae.*
Phytopathology 1952 : **42** : p. 480. (Abst.).

Colourless mutants appeared in certain monosporidial black lines of *U. Zeae*, at rates of 0·1% or more, and often tended to dominate the original black colony. Many colonies of diverse colour appeared in dilution plates from sporidial suspensions of young homogeneous black colonies. Black colonies induced by exposure to polonium showed a similar instability. Back mutation to black occurred among the colourless mutants, but at a lower rate. The black pigment resulted from oxidation of phenolic compounds by tyrosinase and its formation was inhibited by ascorbic acid.

963 HOLTON, C. S.
***Tilletia elymi*, an apparently homothallic species.**
Phytopathology 1952 : **42** : 635–36.

Chlamydospores of *T. Elymi* obtained from *Elymus glaucus* were germinated at 5° C on water agar. On the basis of the relatively small number of primary sporidia, the absence of fusion and the multinucleate condition of both primary and secondary sporidia, it is assumed that *T. Elymi* is homothallic, unlike other species of *Tilletia*.

964 BROWN, A. M.
Mutation in the incitant of leaf rust of wheat, *Puccinia triticina.*
Phytopathology 1952 : **42** : p. 479. (Abst.).

The occurrence of a weak strain of race 15 of *P. triticina* is reported; the aberrant is believed to have arisen through mutation. It required a week longer than the parent race to reach its full development in the uredial stage; in addition, its uredospores were less viable and germinated slowly.

965 RAPER, J. R. and SANANTONIO, J. P.
Heterokaryotic mutagenesis in the tetrapolar fungus, *Schizophyllum.*
Genetics 1952 : **37** : p. 616. (Abst.).

Matings of mycelia possessing common incompatability alleles at locus *A* produce reciprocally constituted, stable and infertile heterocaryons. In cultures of aging heterocaryons of this type, mutants occur with a frequency of 10^{-9} to 10^{-5}, compared with the upper limit of a frequency of 10^{-11} for mutants in the normal component mycelia. The mutants in these heterocaryotic cultures are monocaryotic, and approximately equally distributed between the two mating types of the heterocaryotic compounds. They comprise about eight distinct morphological types; each mutant so far tested has differed from the normal by a single locus. Of the 60 morphological and biochemical mutants isolated from normal monocaryotic mycelia irradiated with ultraviolet light, only two correspond to mutant types from the cultures of aging heterocaryons. Mutants of the same types as those appearing in heterocaryons may be induced in normal monocaryotic mycelia, by growing them for 10 to 20 days in cell-free filtrate of the aged heterocaryons derived from common *A* matings.

966 Barnett, H. L.
Results of crossing isolates of *Chalara quercina* from different states.
Phytopathology 1952 : **42** : p. 463. (Abst.).

Ch. quercina is normally heterothallic, bisexual, self sterile and cross fertile. All the numerous isolates tested were capable of acting as male and fell into one of the two known compatibility groups. No evidence of geographical races was obtained. Some isolates failed to act as female when crossed with a number of other isolates; one culture was shown to be a unisexual male.

967 Roane, C. W.
Nuclear cytology and morphologic variation in *Helminthosporium carbonum* Ullstrup.
Phytopathology 1952 : **42** : p. 480. (Abst.).

The nuclear condition of the mycelial cells, conidiophores and conidia of *H. carbonum* race 1 was studied by means of a modified Feulgen technique. The observations indicated that the fungus is heterocaryotic and that heterocaryosis may be maintained indefinitely.

968 Doermann, A. H. and Hill, M. B.
The arrangement of genetic loci in bacteriophage T4.
Genetics 1952 : **37** : p. 577. (Abst.).

Turbidity of plaque halos in bacteriophage T4 is genetically determined. An analysis has been made of five of the *tu* loci for turbidity. All two-factor crosses involving genes at these *tu* loci and four other loci have been effected. The data on recombination indicate that the nine loci fall into three linkage groups and that the loci have linear arrangement. It was concluded that in individual matings recombination in one region occurs independently of recombination in an adjoining region.

969 Adams, M. H.
The hybridization of coliphage T5 and *Salmonella* phage PB.
J. Immunol. 1951 : **67** : 313–20.

Mixed infection of the Cullen strain of *Escherichia coli* with phage T5 and a serologically related phage, PB, resulted in the simultaneous multiplication of both viruses in the same host cell. At least one-third of the infected bacteria liberated both T5 and PB phages. Virus progenies also included 18 previously unrecorded hybrid strains, differing from both parents. Five distinct genetic recombinations have already been determined among these hybrids. Although hybridization between viruses has not yet been studied under natural conditions, it is probable that genetic recombination may have contributed to their capacity for variation during evolution. The significance of controlled hybridization to experimental virology is emphasized.

970 Luria, S. E. and Human, M. L.
A nonhereditary, host-induced variation of bacterial viruses.
J. Bact. 1952 : **64** : 557–69.

When several B/4 mutants of *Escherichia coli* B, resistant to phages T4, T3 and T7, are infected with phages T2 or T6, they liberate modified phages, designated T*, which are incapable of multiplying in young cells of the parent strain or its mutants. T* phages do, however, multiply in some older bacteria of the original parent strain, yielding the normal T2 or T6 phages. It is suggested that the phenotype of the virus, expressed in various phases of interaction with the host cell, may be partially controlled by nongenetic cytoplasmic components. On the other hand T* may be an imperfect form of phage resulting from an inadequate supply of an essential component in the host; the defect would prevent development of active phages. In older cultures adequate supplies of this component may be available.

971 Siegel, R. W. and Wildman, S. G.
The differential sensitivity of two strains of tobacco mosaic virus to ultraviolet light.
Genetics 1952 : **37** : 624–25. (Abst.).

The mild strain of tobacco mosaic virus has shown a much greater sensitivity to ultraviolet light than the common strain. Both strains exhibit an exponential survival curve. Spontaneous mutation of the common strain to the mild form has been repeatedly detected in the following manner. A purified solution of the common strain has been irradiated until 5% survival occurs, any mild virus present thus being killed. No tobacco plants showing mild symptoms have been obtained after single particle injections with this irradiated solution, but virus isolated from a plant infected with a single particle of the irradiated solution has contained approximately 2% of the mild strain. No cases of mutation of the mild to the common strain have been discovered, although the latter has a competitive advantage in tobacco plants infected with a mixture of the two strains under ordinary greenhouse conditions.

972 French, R. C., Graham, A. F., Lesley, S. M. and van Rooyen, C. E.
The contribution of phosphorus from T2r+ bacteriophage to progeny.
J. Bact. 1952 : **64** : 597–607.

Escherichia coli B individuals, infected by T2r+ phages incorporating P^{32}, were dissected at intervals and the amount of P^{32} contained in the virus progeny was determined. About 35% of the P^{32} was traced in the progeny, transference being completed after 22 mins. when less than one-quarter of the final phage yield had been produced. Parental phosphorus is, therefore, not included in progeny developing after 22 mins. Since the genetic properties of phages developing both early and late are the same, it is assumed that transference of parental phosphorus is not necessary for the transmission of hereditary determinants.

CROP PLANTS

973 **The work of FAO 1951/52. Report of the Director-General.**
FAO, Rome 1952 : Pp. 32.

Wheat. At the Near East Wheat Breeding Conference held at İstanbul, in June 1952, the following projects were recommended: (1) a cooperative survey to study rust epidemics and to identify the races concerned; (2) establishment of uniform cooperative nurseries in various countries for observing resistance to the three species of wheat rust prevalent in the region; and (3) a cooperative programme of breeding for rust resistance. Plans were also laid for establishing uniform nurseries for the observation of resistance to bunt in wheat and for uniform tests on barley.

Maize. The international programme of testing hybrids in Europe and Mediterranean countries has now reached the stage at which breeders are developing their own hybrids specifically adapted to local conditions. The fifth FAO meeting on hybrid maize, held at Zürich in 1952, led to further progress in cooperative arrangements for regional exchange and testing of breeding material and for the establishment of uniform standards of seed certification.

Rice. The International Rice Commission and its working parties on rice breeding and on fertilizers met at Bandung, Java, in May 1952. Breeding carried out at Cuttack, under the auspices of the Commission, has resulted in over 100,000 cross pollinations between the *indica* and *japonica* types; a total of 200,000 is aimed at to provide adequate material for selection. The response to high levels of fertilizers shown by the *japonica* group is to be combined with the hardiness and adaptation to tropical conditions characteristic of the *indica* rices. Seed of numerous F_2 crosses and back crosses has been distributed to eight participating countries for testing. Other coordinated projects include investigations on resistance to lodging and response to different day lengths.

974 **Committee for Colonial Agricultural, Animal Health and Forestry Research, Seventh Annual Report (1951-1952).**
Colonial Research 1951–1952. HM Stationery Office, London, 149–87.

Brief reports of crop breeding are included. Most of the work in progress has already been referred to in *Plant Breeding Abstracts.* Among the new activities and results mentioned the following are of particular interest:—

Maize. Breeding for resistance to *Puccinia polysora* is to be undertaken in West African territories by a regional research organization, as recently this disease has become serious.

Banana. According to investigations at the Imperial College of Tropical Agriculture, Trinidad, the clone Mariani and some related clones from Assam probably represent a new species which bridges the gap between sections *Eumusa* and *Rhodochlamys.* If these clones can be validly regarded as primitive, the centre of origin of the 22-chromosome species can be located in the Burma-Assam region with some certainty.

975 **Report (abridged) to the Annual General Meeting 31st July 1952 by the Board of Directors and the Director of the Scottish Society for Research in Plant Breeding 1952** :
Pp. 37.

Oats. The technique is described by which rooted tillers from the triploid hybrid *Avena barbata* x *A. strigosa* ($2n = 21$) were treated with acenaphthene vapour for a period of four months so that successive tillers were exposed to the vapour as they appeared but older shoots could grow out of the influence of the vapour. From the grains produced by treated plants (cf. *PBA*, Vol. XXII, Abst. 168), 26 fertile amphidiploids ($2n = 42$) were obtained. In addition to these hexaploids, other acenaphthene-induced polyploids available at Corstorphine include tetraploid *A. strigosa* ($2n = 28$), an octoploid hybrid ($2n = 56$) between *A. sativa* and *A. strigosa*, and a duodecaploid form of *A. sativa* ($2n = 84$).
The performance of numerous selections made

in previous seasons is discussed. Hybrid 0532 (*A. byzantina* x Quality), bred for resistance to alkaline conditions, yielded well on Tiree. The colchicine-induced polyploid Aa A18, which has shown a high degree of resistance to sprouting in the stook, outyielded Sun II, Yielder, Onward and Star at Corstorphine; its early maturity indicates that it may be useful for fodder purposes, the grain being rather large for milling. As the early ripening short-strawed Potato type Aa 676 has consistently yielded better than the standard Potato oat in the Donside area of Aberdeenshire, it has been named Albyn Donside and is to be released for that region.

Barley. A stiff-strawed selection, Ac 370, has been distributed for regional trial.

Forage grasses. Competition between ryegrass strains of different maturity was observed in a mixed sward sown with equal numbers of viable seeds of an early and a late strain of similar plant size. After four years the early strain, which constituted 52% of the sward at the end of the first year, represented only 6% of the total population, although in a pure stand subjected to the same amount of grazing it maintained itself successfully. In another test, in which the late strain was replaced by one of smaller size, the final sampling showed 74% early and 26% late. The practicability of special purpose strains for extending the grazing period thus appears to be restricted to pure stands only.

Swede. An early maturing line with dry matter content of 12·2–13·6% has been selected from AMN, a hybrid strain (ACF x ABJ) with an average of 8·1% dry matter. Some late maturing selections derived from ANM (Excelsior x Stirling Castle) had a dry matter content above average, one reaching 11·2%; further selection has, however, produced larger roots which are too soft. Another line of ANM has shown resistance to clubroot.

Potato. Isolates of *Phytophthora infestans* from Scotland, England, Belgium, Kenya, Southern Rhodesia, South Africa and Peru were reexamined and three new biotypes were discovered, which, in addition to the seven strains previously isolated, have extended the scope of research on interrelationships between the biotypes of the pathogen and genes controlling hypersensitivity in the host. No further biotypes were found among local strains of blight from the Netherlands and USA; in both countries, specialization of *Phytophthora* follows the same pattern as in Scotland. Each biotype is most virulent on a particular *Solanum* genotype, presumably its original host. Biotypes with a wide host range are unlikely to survive in competition with the prolific common strain whose natural host is *S. tuberosum*, but newly developed hypersensitive varieties provide a means of isolating and multiplying biotypes which would otherwise remain undiscovered.

Prospects of breeding for resistance to *Heterodera rostochiensis* have improved with the discovery of highly resistant lines in the Commonwealth Potato Collection.

Research on the inheritance of resistance to viruses has continued. The high yielding selection 1253a (12) derived from crosses between *S. Rybinii*, *S. demissum* and *S. tuberosum* has been registered as Pentland Ace; it is resistant to three strains of blight, immune from viruses X, A and B, and is of good cooking quality.

Sugar beet. Selection of nonbolting material bred by the Cambridge Plant Breeding Institute has continued. Various other lines on trial include hybrids between sugar beet and garden beet, and progenies of male sterile introductions from America pollinated by nonbolting strains and other beet.

Kale. A New Zealand introduction called Hybrid Kale has given a gross yield similar to the local marrow-stemmed strains, but as the proportion of leaf to stem is higher, the leaf yield equalled that of thousand-headed types.

976 DIX, W.
Allerlei aus der Pflanzenzüchtung.
(**Miscellaneous notes on plant breeding**).
Saatgutwirtschaft, Stuttgart 1952 : **4** : 83–86.

The following aspects of plant breeding are considered: developments since the discovery of Mendelism; problems of administration and economic organization in the Federal Republic, the position of the breeder and the relations between the government and the research institutes; seed production and Popov's stimulation technique; early and late sowing and adaptation in wheats; rate of sowing; cold resistance in wheats; and sugar beet quality and selection of mother plants for seed.

977 Institut National de la Recherche Agronomique. Rapport Annuel, 1949.
(**National Institute of Agronomic Research. Annual report, 1949**).
Paris 1950 : Pp. 163.

A progress report on the work of the institute is given below (cf. *PBA*, Vol. XXII, Abst. 174):—

Wheat. Breeding for resistance to fungous diseases, cold and foot rot is proceeding. At the Dijon station, two hybrids, bred at the Colmar Station before 1949, red S.145 and white S.145, are being studied. Hybrids from the Central Station and other varieties were tested at the high-altitude Station at Chaux-des-Prés for their reaction to cold.

Buckwheat. The botanical and physiological features of a collection of buckwheats are being analysed with a view to breeding. Natural hybridization was also studied (cf. Abst. 261). The genetics of long and short styles is being investigated.

Oats. Breeding operations at the various research stations were concentrated mainly on spring oats, the following being the main aims: resistance to smut, black rust, crown rust, mildew, lodging and frit fly. The Central Station has bred two selections of oats with fine grain and resistant to lodging. The production of naked oats combining productivity with resistance to lodging and early varieties for mountain districts is proceeding.

Maize. In studies of hybrid maize, inbred lines are being evolved for top crossing to obtain French hybrids. Since 1948, selfing of European flint types that do not tiller and are earlier than the American types has been effected.

Trials, though adversely affected by the drought, showed that: (1) the open-pollinated French varieties tested equalled the American hybrids; and (2) the F_1 and F_2 yields from the hybrid W.416 did not differ significantly.

Barley. Research on fodder and malting types is being conducted. Higher yields, resistance to diseases and lodging, and beardless types are the main objectives in barley breeding. Winter and spring habit is also being studied in connexion with dual purpose barleys.

Rice. The vegetative cycle of the varieties in a rice collection was studied in 1949 and the interesting varieties are to be multiplied.

Herbage grasses. At Versailles, morphological and physiological analyses, including tests of disease and frost resistance, of species of herbage plants have been carried out on populations of different provenance (cf. *PBA*, Vol. XXII, Abst. 2767); a number of ecotypes have now been identified.

Mother plants have been obtained by mass selection of material from various sources in France and abroad and the clones obtained are being studied for their reaction to grazing and mowing. The clones have also been crossed and selfed to investigate (1) the loss of vigour from inbreeding; (2) tillering capacity; and (3) seed production. In some cases fertility varied in reciprocal crosses.

The hybrid progenies often proved more homogeneous and nearly always more vigorous than those from selfing.

Sorghums. Varietal studies of grain and sweet sorghums and Sudan grass are in progress at the Montpellier Station. A collection of sweet sorghums from North Africa, Italy, the USA, Canada, Brazil, Uruguay and southern India is undergoing ecological investigation Early varieties contain less sugar than late types.

Lucerne. A collection of ecotypes and varieties. from France and other countries has been studied from taxonomic, ecological and agronomic aspects.

The agronomic characteristics of progenies from selfed mother plants obtained by mass selection in populations of Flemish lucerne have been noted and some of these families have been selected on the basis of photoperiodic reaction and vegetative type for ultimate comparison with the populations in cultivation. Numerous self sterile types have been found that are highly cross fertile.

Potatoes. A collection of 250 varieties is being described with observations on their uses and disease resistance. At Châteaulin, breeding for disease resistance combined with desirable crop characteristics is being carried on.

Flax. The systematic description of the flax collection at the Central Station has been amplified by notes on phenological characteristics and a biometric study of the stems, capsules and seeds; some disease resistant plants have also been discovered. Fibre flax breeding aims at fibre quality, yield of straw and hardiness; while for linseed the objectives are high seed yield and rapid growth so that early, machine harvesting can be used. Resistance to *Polyspora* and *Ascochyta* is also necessary.

Hemp. Initial material has been collected for breeding a hermaphrodite hemp suitable for French conditions.

Sugar beet. Plants free from *Cercospora* or yellows have been used in the preliminary selection work in connexion with a study of plant characters affecting yield.

Hops. A preliminary study of the technological and malting value of the hops produced in eastern France was begun in 1949.

Oil crops. Crosses were made between colza and winter cabbage and between rape and winter cabbage.

Winter hardiness, early flowering and the effects of selfing were studied in various French and foreign populations, and yield trials of French and foreign varieties of colza and rape were also carried out; Lembke and its ecotype Alsace were the best.

Research on white mustard included selection of the population Mansholt to obtain a late, forage type, and of the spring population Vilmorin to obtain an early type for seed.

To breed a spineless variety of *Carthamus* with large seeds, crosses were made between the Indian variety and the ordinary spineless selection.

Chestnut. The search for *Phytophthora cambivora* resistant types continues. Crosses have been made between *Castanea crenata* and *C. mollissima*, which are resistant, and *C. sativa* which is susceptible (cf. Absts. 636 and 637).

Vine. At Montpellier, hybridization has been carried out for inheritance studies.

A method of ampelographical description has been devised as a basis for an international system.

Crosses between Gamay and various hybrids were made at the Clermond-Ferrand Station.

Other fruits. Work on stone fruits included: studies of varieties and populations of peaches and plums and selection of the most promising types; clonal selection of the main varieties of peaches, apricots and plums; and a search for new varieties with special reference to disease resistance, flavour in early peaches and fruit size in nectarines. Nectarine x peach crosses have been back-crossed.

With a view to establishing a catalogue of varieties and synonyms, morphological, physiological and phenological studies have been made of apple and pear varieties. The botanical characteristics of cider apples are also being investigated with a view to selection of superior types in the different regions of France.

Jerusalem artichoke. A systematic study of 70 varieties is in progress. Selection among progenies from 1948 sowings has revealed some combining excellent shape with good yielding capacity. Some selections from a sowing of Blanc précoce [Early White] have characters intermediate between the Jerusalem artichoke and the sunflower and their cytology and photoperiodic reaction will be studied.

Fodder cabbage. Twenty-two strains or populations of different types have been collected for systematic study and the ultimate isolation of particular types. Inbreeding effects are being investigated.

978 Novak, A.
(The Far Eastern Scientific Research Institute of Agriculture and Animal Husbandry).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 10 : 56–58. [Russian].

Cereals. Productive spring wheats, DV–4 and DV–5 [Far Eastern 4 and 5], showing resistance to stem rust and lodging have been bred at the institute. In the trials the new wheats outyielded Lutescens 62. New rices, which are more productive than the standard Santahezskiĭ 52 have been developed.

Forage plants. Mention is made of new productive grasses, adapted to the climatic conditions of Habarovsk, and of new varieties of soya bean B–563 and B–484, which yield 250 c. green substance and 50 c. good quality hay per ha. Amurskaja Buraja 57 [Brown Amur 57] and Amurskaja Černaja 116 [Black Amur 116] have been released.

Stone fruits. Some hardy apricots have been obtained. Several plums, from crosses between local plums and some Manchurian and American varieties, remarkable for good quality of their fruits, have been made standards in the Habarovsk territory. New early *Prunus tomentosa* hybrids yielding 8–12 tons of fruit per ha. have been developed.

Cucumber. DV 27 and DV 108 have passed their trial stage.

Tomato. New productive varieties include Habarovskiĭ Rozovyĭ 308 [Habarovsk Pink 308], which yields 516 c. per ha., Štambovyĭ 193 [Determinate 193] and Štambovyĭ 311.

Soya bean for grain. E–630 is more productive and earlier than Amur 42 which had previously been bred at the institute. Both varieties are being tested in different regions of the USSR.

979 Belozorov, A.
(The Siberian Institute of Grain Farming).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 9 : 54–55. [Russian].

Wheat. The productive spring wheats Milturum 553 and Milturum 2078 have been developed. The latter is a week earlier than the standard Milturum 321, has good baking and milling properties and shows resistance to shedding, lodging and loose smut. A new hardy winter wheat, Omsk 6, has been obtained by training the spring standard Milturum 321 for the winter habit.

Rye. A hardy new winter rye Sibniizhoz* 1 has been bred.

Barley. New varieties adapted to the Siberian climate include Omsk 13709, Omsk 10664, Abrek and an unnamed naked seed variety.

Grasses. The productive brome varieties 1585 and 189 have been selected.

Potato. Vegetative hybridization has proved valuable in breeding for high starch content. New productive varieties with a high starch content include Sibirjak [Siberian], Severjanin [Northerner] and Sedov.

980 Arbetsplan för Weibullsholms Växtförädlingsanstalt för år 1953. (**Research programme for Weibullsholm Plant Breeding Institute for the year 1953**) : Pp. 42.

This programme of work follows the same arrangement as in previous years (cf. *PBA*, Vol. XXI, Abst. 1674). Section I relates to variety trials, local trials of breeding material, the cytological laboratory and seed control. Section II contains information on cereals, meadow and pasture plants, pulses, oil crops, maize for silage, and root crops. Section III deals with various types of legumes, brassicas, cucumbers, leeks, carrots, parsnips, parsley, radishes, garden beet, lettuce, celery, spinach, melons and tomatoes. Some information is incidentally included on advances made during the year.

981 D.L.F.s generalforsamling 1952. (**General meeting of the DLF, 1952**).
Tidsskr. Frøavl 1952 : **21** : 45–57.

In this report of the Danish Farmers' Associations for Seed Production [DLF] mention is made of a new rye, Øtofte élite I, bred at the Øtofte Experimental Station. It has done well in trials and, though rather long in the straw, will be tested further.

At Toftø nursery, new strains of cauliflower and cucumber have been certified (cf. *PBA*, Vol. XXII, Abst. 1017).

982 MEHTA, T. R.
Some practical considerations for success in plant breeding.
Agric. Anim. Husb., Uttar Pradesh 1951 : **2** : No. 4 : 34–41.

The view is expressed that the breeder may lay too much emphasis on yield, neglecting other characteristics necessary for the success of varieties. A discussion is given of breeding for yield in relation to growth conditions, earliness, quality, various local factors and market requirements, and resistance to diseases and pests, with particular reference to problems encountered in Uttar Pradesh.

983 **Administration Reports of Subordinate Officers of the Department of Agriculture, Madras for 1949-50** (1951) : Pp. 782; **1950-51** (1952) : Pp. 804.

Sorghum. Selection and hybridization are being applied to many types to improve yielding ability and grain and fodder characters at Coimbatore and other stations. In breeding for resistance to *Striga*, AS 4003 and AS 4693 have been used as sources of resistance.

Sorghum halepense ($2n = 40$) showed 20 bivalents during meiosis; secondary association of 4 bivalents was noted.

Other millets. Breeding of *Eleusine coracana* and *Setaria italica* is reported. Production of F_1 hybrid strains of *Pennisetum typhoides* continued, using inbreds or mass selections as parents. *Paspalum scrobiculatum*, *Panicum miliare*, *Panicum miliaceum* and *Echinochloa frumentacea* were selected.

Cytogenetical investigations have been carried out on F_1 hybrids between *Pennisetum typhoides* ($2n = 14$) and *P. purpureum* ($2n = 28$), on colchicine-induced amphidiploids and on derivatives of both the undoubled and doubled hybrids. *P. purpureum* has been found to have two genomes, designated A and B, A being homologous with the genome of *P. typhoides*. A colchicine-induced autotetraploid of *P. typhoides* (cf. *PBA*, Vol. XXI, Abst. 340) has been crossed with *P. purpureum*, and with allotetraploid and allohexaploid forms involving *P. purpureum* and *P. typhoides*. Other species of *Pennisetum* have also been subjected to cytogenetical analysis. *P. Ruppelli* is partially apomictic.

Rice. Further new strains resulting from pure line selection of mixed local varieties were released. The blast resistant strains Co. 25 and Co. 26, developed by hybridization, have also been issued; they are in addition fairly resistant to *Helminthosporium*. Crossing of the blast resistant long-duration Co. 4 with strains of various durations was effected. Indigenous short-duration strains may show insufficient dormancy; to overcome this defect five such strains have been crossed with exotic varieties. Progress is reported in the selection of hybrids between cultivated and wild rice for drought and flood resistance, and of crosses between saline resistant varieties and local high yielding strains. Crosses between vars. *japonica* and *indica* varieties were made.

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* Sibirskiĭ Naučno-Issledovateljskiĭ Institut Zernovogo Hozjaĭstva [Siberian Scientific Research Institute of Grain Farming].

Work on the species collection has led to the conclusion that cultivated rice has evolved from *Oryza perennis* through human selection, and that the *spontanea* varieties are of a collateral descent and constitute a genetically complex group within *O. sativa* (cf. *PBA*, Vol. XXII, Abst. 1729). Marked differences in size and shape of the chromosomes have been found among species. Hybrids between varieties from different countries are being treated with colchicine to induce chromosome doubling. The value of X irradiation and chemicals for the production of mutants and for reducing sterility is being explored.

Sweet potato. Yellow-fleshed selections, obtained from a hybrid introduced from Hawaii, are expected to be valuable for transmitting the character of yellow flesh to local high-yielding but white-fleshed types.

Cotton. Several schemes of breeding Old and New World cottons are reported (cf. Abst. 1310).

Wild species, e.g. *Gossypium Darwinii*, *G. taitense* and *G. tomentosum*, have been crossed with cultivated American cottons to introduce earliness and resistance to drought, pests and diseases into the latter. Heterosis in intraspecific and interspecific crosses involving the four cultivated species is under investigation for its practical value. A cleistogamous mutant arising in the progeny of Co. 2 x Maarad was recessive to the normal condition. A crinkled leaf mutant depended upon a single, incompletely dominant factor, independent of R_2^{OS} (cf. *PBA*, Vol. XXI, Abst. 1982). The lintless mutant li_a behaved as a simple recessive to the fully linted CST 3, and was independent of R_2^{OS}. The Coconadas short linted mutant CST 1 was also found to be a simple recessive.

Castor bean. Three improved varieties were hybridized, to render them earlier. An ornamental type was used to breed strains with easily identifiable characters.

Sesamum indicum. Hybridization was carried out to produce a white-seeded strain, and also strains with economic characters such as profuse branching, 1 to 3 flowers per axil, 8-locular capsules and high oil content. Intervarietal and interspecific polyploids induced by colchicine are under investigation.

Citrus. All South Indian species examined possess a chromosome number of $2n = 18$.

Mango. Promising hybrids included Neelum x Baneshan. In a survey of chromosome numbers, all varieties had $2n = 40$, with one exception ($2n = 60$).

Groundnut. Hybridization was carried out to develop a dormant bunch type and a white-seeded strain, and to improve AH 6481 and TMV 1 as regards earliness and, in the case of the latter, also shelling outturn.

Coconut. Tall x Dwarf progenies, which came into bearing as early as the Dwarf parent, continued to show good yields and satisfactory nut and copra quality. Further crosses were effected between West Coast Tall and Dwarf and between Andaman Dwarf and Straits Settlements. Vigorous seedlings have been obtained from intravarietal crosses between parents involving the characters thick flesh, high yield and abundant production of female flowers.

Pulses. Selection continued (cf. Abst. 1572).

984 Annual Administration Report of the Agricultural Department, Bangalore, for the year 1946-47 (1950) : Pp. 402.

In addition to the work referred to below, trials were carried out on varieties or selections of wheat, maize, sorghum, flax, linseed, tree fruits and several other crops.

Eleusine coracana. Trials were carried out on introduced varieties, hybrid strains from R 0889 (Majjige) x R 0324 (Coxcomb) and on many selections at the Hebbal Farm.

Panicum* and *Echinochloa. *P. miliare*, *P. miliaceum* and *E. frumentacea* are being selected for high yield and drought resistance.

Rice. Hybrid progenies of the Maidan type were studied at Negenahalli. Strains of summer rice were tested at the Hebbal Farm. Strains of the Punaji varieties Doddabyra, Hunaschoovinabhatta and Bilebhatta showed promise. High yielding strains of Malnad were multiplied at the Bikli Farm.

Cotton. Selections of Asiatic cotton were obtained from crosses involving Jayawanth, *Gossypium cernuum*, H 190, Sel. 69, Jarila, N 14 and CN at the Babbur Farm. Trials of Mysore-American and Egyptian cottons were carried out at the Irwin Canal and Babbur Farms.

The multiplication and distribution of the Asiatic cotton Sel. 69 and American variety MA V are under way.

Sugar cane. Progress is reported in developing thick canes with high sucrose content, suitable for the manufacturer and also the small cultivator who converts his cane into jaggery.

Groundnut. Work continued on the scheme for the production of (1) early erect strains suitable as substitutes for Spanish and Small Japan; (2) early erect types producing large nuts; and (3) late strains superior to HG 1 and the spreading Cormandal types.

Coconut. Selection of mother trees for seed purposes is being carried out.

Pulses. The results of selection of *Cajanas Cajan*, *Dolichos Lablab*, *D. biflorus*, *Cicer arietinum* and soya bean are summarized (cf. Abst. 1572).

985 Rapport sur les travaux de recherche effectués en 1950. (**Report on the research carried out in 1950**).
Ann. Serv. Bot. Tunis. 1949 : **22** : Suppl.: Pp. 80.

Wheat. Investigations were continued on the method of mass selection in relation to yield and on the genetic basis of the "spatulate" mutant in wheat (cf. *PBA*, Vol. XXI, Abst. 2450). Effects of various treatments of wheat with yperite, X rays and ultrasonic waves are also being studied. Seedlings from soft wheats, treated with ultrasonic waves, showed certain anomalies.

Selection of hard and soft wheats was continued with due attention to resistance to diseases and lodging.

In comparative regional trials the hybrid D 115 [(Derbessi x Biskri) x M'Rari 1 lr] outyielded the control Ariana 8 and the other wheats repeatedly; it has short straw, a dense ear and round short kernels, and yields a dough of good quality.

Rust resistance was studied in 167 varieties and lines, 155 of which were new. Marked resistance was exhibited by lines of Thatcher and the hard wheats Sbéi x M'Rari 9 lr 6. Mahmoudi x M'Rari 9 lr 10 and a line of M'Rari. In the moderately resistant group were 77 lines derived from Florence x Aurore and 21 from Schaffiano. A variety of *Triticum monococcum* proved immune and Vernal (*T. dicoccum*) showed little damage.

In the production of new hybrid lines crosses were made to improve the grain colour of Tunisian varieties by hybridization with Carleton. The latter was also crossed with a very early Egyptian hard wheat, Zenati Bouteille, and with another hard wheat, Roussia, a hardy type from the humid regions of Tunis.

Other cereals. Comparative trials of barley and oat varieties were run; and in breeding, resistance to foot rot and lodging were among the criteria used in selection.

Maize. In nonirrigated plots very early hybrids yielded less than Tunisian maize under conditions of open pollination.

Tobacco. Analysis of the alkaloid content is being carried out on 100 varieties undergoing selection.

Almond. The search for an eelworm resistant stock is being continued with foreign and local material.

Fruits. From 1273 apricot crosses of Caninos and the local apricot Hamidi, 162 hybrids were obtained and seedlings from the previous year's crosses of Giletano x Chèchi and of Caninos x Hamidi were planted.

Regional trials of hybrid vines were continued and 11 new hybrids were raised. An attempt is also being made to obtain seedless grapes with the muscat flavour.

Tomato. Lines of the variety Canatella are undergoing further selection for yield and quality of the pulp and some lines from Djaffar, Galaat-el-Andeless and Utique have shown high yield combined with large fruits and a high percentage of dry extract. Of two other lines, 47–3 with spherical fruits and 49–8 with elongated fruits, the first is mentioned for its yield and quality and the second for its productivity and earliness.

Selection work on 70 imported early varieties is proceeding to obtain various types in demand by growers.

Legumes. Varieties of *Phaseolus* spp., *Pisum* and other legumes have been introduced and are undergoing trials.

In small scale trials of 131 lines of chick peas the local variety was superior in all cases.

986 **Record of Investigations No. 2 of the Department of Agriculture, Uganda Protectorate for the period 1st April, 1949, to 31st March, 1950** (1952) : Pp. 63.

Sorghum. Selection of dwarf grain varieties suitable for mechanical harvesting is receiving attention at Serere.

Cotton. A survey of breeding work on blackarm resistance is included. Knight's technique has proved successful at Serere but not at Kawanda; it is now generally agreed that the gene B_2 alone confers very limited resistance on cotton growing under conditions of heavy rainfall. The programme of blackarm control is now concerned with discovering whether the bacteria on the seed coat constitute the principal source of primary infection.

Cassava. Mosaic resistant varieties selected at Kawanda gave good results in trials.

Coffea arabica. Individual yield records of trees of Kent's selection were made for the second successive year at Bugusege. Self-pollinated seed of half of these trees was sown to provide material for line selection as soon as the parents can be chosen.

987 **Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya, 1950** (1952) : **2** : Pp. 186.

Pyrethrum. A significant negative correlation between pyrethrin content and yield of flowers has been detected; selection for high content of pyrethrins only may therefore result in poor yields of flowers. To overcome this difficulty, crosses have been made between clones with high content of pyrethrins and a vigorous strain with low content.

The first seed issue of 188 x 214, a strain for low altitudes, has been planned. The cross 127 x 481 for high altitudes shows particular promise as regards both yield and pyrethrin content, and has yielded 33·3 lbs. pyrethrins per acre.

Wheat. The occurrence of a ninth race (K9) of black stem rust has been established.

The following new varieties were released: the beardless, white-chaffed and white-grained wheats 360H (294M7C6C x 184P2A1E), 337BE2F2 (223F1A3 x 291J1B1), 338AA1A2 (192Q2AL x Australian 27/2215), 350AD9C2 (223F1A3 x 294M7C8) and 341F2D1 (279I5F2 x Eureka G2503), and the bearded, white-chaffed, red-grained wheat 184P2A1A [Reliance x 296B6Y(L)]. The varieties 360H and 184P2A1A show full resistance to all nine races of black stem rust in seedling tests; 341F2D1 possesses resistance to races K1 to K7; the remaining three varieties are each resistant to races K1 to K8. All the new wheats are resistant to orange leaf rust, and up to certain altitudes are also resistant to yellow ear rust. The varieties 360H, 338AA1A2 and 184P2A1A have medium maturity; the other three are quick maturing. The wheats 338AA1A2 and 184P2A1A have good baking quality.

Multiplication of 351A51B2 (117A x Regent) and the durum wheat Carleton (CI12064) is to be continued, in view of the resistance to races K1 to K9 of black stem rust that they have shown in seedling tests.

Information is given on introductions and crosses under investigation at the different altitudes.

Oats and barley. Testing of introduced varieties continued.

Maize. Work on the development of inbreds as parent stocks of hybrids for the different maize-growing areas is under way. All introduced hybrids compare very unfavourably with local open-pollinated varieties as regards yield and other characters.

Sorghum. Breeding has two aims: (1) improvement of local varieties for African use; and (2) production of dwarf types suitable for combine harvesting, for use in the European farming areas. Local and introduced varieties are therefore being tested; the latter include dwarf types from the USA.

Coffee. Several selections have given higher yields of clean coffee per acre over a five-year period than the French Mission type.

Sunflower. Single plant selections of the semidwarf varieties Mars, Pole Star and Jupiter were made for dwarfness. These varieties are suitable for combining in the lower, hotter regions, but grow too tall in the cooler districts above 7000 ft., where shorter varieties are required.

Rubus. The cross Youngberry x a wild *Rubus* sp. was made at Molo, in an attempt to combine the vigour of indigenous species with the fruit qualities of Youngberry.

Strawberry. Selections of Eleanor Roosevelt x Massey and Eleanor Roosevelt x NC 1053 show promise with respect to size and flavour of the fruit and freedom from disease.

988 **Annual Report of the Department of Agriculture, Tanganyika, 1950** (1952) : Pp. 262.

In addition to the work summarized below, varietal trials with the following crops are reported: wheat, maize, sorghum, *Setaria*, *Panicum* and *Eleusine* millets, rice, legumes, cassava, tobacco and linseed.

Sorghum. Considerable resistance to *Striga* was shown by Dobbs and P 41 in field plots at Ukiriguru and Mabuki. Selections of Dobbs were crossed with DD Shallu to combine *Striga* resistance and early maturity with good grain characteristics. F_1 hybrids grew vigorously, producing many tillers, and matured at the same time as Dobbs; the grain quality of Shallu was recessive, but it is hoped that F_2 segregates with improved grain type will be obtained. Since many combine types about 3 ft. high proved less able to compete with weeds than taller varieties, plants of 5–6 ft. are to be selected for future breeding; the latter have been harvested successfully by combine at Kongwa. A mixed stand of 23 unrelated selections, all over 5 ft. high, possessing various agronomically desirable characteristics, has been grown to allow open pollination; many new hybrid combinations are expected.

Cotton. Breeding reported from Ukiriguru has already been summarized in *PBA*, Vol. XXI, Abst. 2822.

Sisal. Bulbils from 40 selected *Agave* hybrids are undergoing field tests at Mlingano, using commercial sisal strains as standards. Several hybrids survived a long drought during which the commercial strains died. The hybrids also proved tolerant of weevils.

Coffee. At Lyamungu, Moshi, clonal and seedling progenies of promising mother trees are being compared. Bean quality has been maintained equally well in both progenies for three seasons.

989 Smuts, I. J. and van Garderen, J.
Agronomy experiments (1927-1946) at the Kroonstad Agricultural Research Station.
Sci. Bull. Dep. Agric. S. Afr. 1952 : No. 320 : Pp. 44.

A survey is included of breeding work on yellow dent and flint maize, and of maize, sorghum, teff, groundnut, cowpea, soya bean and spineless cactus variety trials, carried out at Kroonstad, Orange Free State, during the period 1927–1946. Work on the improvement of yellow dent maize has resulted in the synthetic variety Robyn, derived from 13 nonrelated homozygous types. A synthetic yellow flint variety named Hotnot has also been developed.

990 **Annual Report of the Department of Agriculture, Bechuanaland Protectorate 1951** : Pp. 9. (Mimeographed).

Maize. Seed of the new polycross variety Kalahari, developed at the Mahalapye Experiment Station, was distributed on a limited scale.

Pennisetum typhoides. Lines with a high degree of homozygosity have been isolated. Breeding of a multiple-cross variety is planned.

Sorghum. The best dwarf sorghums outyielded the standard varieties; four of the dwarf varieties were increased for bulk planting at the Morale Experiment Station. Dwarf and standard broomcorns were also tested.

Groundnut. Varieties and breeding lines were tested.

Cowpea. Varieties outyielding the local types have been found.

Other crops. Tests were carried out on varieties of dwarf annual castor bean, sesame, linseed, safflower and okra.

991 **Report of the Minister of Agriculture for Canada for the year ended March 31, 1952** : Pp. 117.

Wheat. Tests at Winnipeg in 1951 showed that none of the wheats grown commercially in North America was resistant to stem rust race 15B. Extensive use has been made of McMurachy, Exchange and introductions from Kenya as sources of resistance to this race. A number of resistant hybrids have been distributed to 23 stations in the Prairie provinces where they will be tested for adaptability and quality.

A new hard red spring wheat, Acadia, has been licensed for release in eastern Canada; it yields well, has strong straw and is resistant to several races of stem rust, leaf rust and at least one isolate of root rot. In greenhouse tests at Lethbridge, variations in the virulence of root rot pathogens were noted. Strains of *Fusarium culmorum* from Peace River produced more severe symptoms than strains from central Alberta. Isolates from infected stubble in central Alberta gave rise to more colonies of *Helminthosporium sativum* than of *F. culmorum*, but in isolates from Peace River *F. culmorum* was the predominant pathogen.

Widespread investigations concerning sawfly resistance have indicated that distinct strains of sawfly occur in different localities. The high degree of sawfly resistance possessed by Rescue has, however, been incorporated in a new variety, Chinook, which has the quality of Marquis. Chinook is susceptible to race 15B of stem rust but resistant to all other races.

Cereal breeders have found that failure in seed setting frequently occurs when artificial light is used to supplement daylight for photoperiodic studies in the greenhouse. Results of preliminary experiments with wheat and other cereals at the Central Experimental Farm, Ottawa, indicate that fluorescent lighting, resembling natural sunlight, accelerates growth and increases the percentage seed set.

Oats. Although no commercially grown oats proved resistant to leaf blotch (*Septoria Avenae*), some wild species appear to be tolerant. Various interspecific crosses have been attempted at Ottawa and Winnipeg in order to obtain new sources of disease resistance. This material is being supplemented by numerous introductions. Strains have been bred at Winnipeg with resistance to all races of stem rust and smut, and to almost half the known races of crown rust. Breeding is in progress at Lacombe, Alta., Scott, Sask., Agassiz, BC, Lennoxville, Que., and Charlottetown, PEI, to develop improved varieties specially adapted to the region served by each station.

Maize. The majority of 28 inbred lines of dent maize tested were susceptible to *Pythium arrhenomanes* but R 4 showed marked physiological resistance as opposed to the capacity to withstand root rot by producing numerous roots.

Barley. At Ottawa the fourth back cross has been made in a programme designed to create homozygous lines of Montcalm with resistance to smuts, mildew, root rot, stem rust and leaf rust. Improvements in the approach method of crossing have led to increased production of hybrid seed.

A few varieties proved tolerant of seven different isolates of root rot (*Helminthosporium sativum*). These include Rabat, which is already being used for breeding owing to its resistance to mildew and leaf rust.

Hybridization was initiated at Ottawa and Agassiz to combine the disease resistance of some spring barleys with desirable qualities of the winter varieties Olympia and Tennessee.

Forage plants. Improvements in productivity, persistence, quality and uniformity of forage throughout the grazing season are being achieved by programmes of hybridization involving numerous introductions, selection, induction of polyploidy, and testing for combining ability.

Increased seed yields given by cocksfoot, timothy, brome and red fescue in spaced rows 30 ins. apart have averaged 20–40% more than from solid stands. Climax timothy grown in spaced rows at Ottawa in 1950 and 1951 yielded more than 500 lbs. of seed per acre, double the seed yields from local timothy meadows.

Several bacterial wilt isolates from different sources varied in virulence when tested on lucerne at Lethbridge. Some hybrids bred at Saskatoon for resistance to winter crown rot showed promising field resistance in plots at Edmonton.

Potato. Seedlings resistant to leaf roll, viruses A, B, X and Y, late blight, common scab and ring rot have been selected at Fredericton.

Evidence for the existence of two strains of witches' broom virus was obtained at Vancouver when potato scions with similar symptoms were grafted on Bonny Best tomato and on *Cyphomandra betacea*.

Fibre flax. The isolation of wilt resistant lines of a few varieties, including Stormont Cirrus, Stormont Gossamer L 26 and Liral Prince, has continued at Ste. Anne de la Pocatière. In trials at several centres, Cascade, Stormont Gossamer L 26 and Liral Prince have given highest yields.

Tobacco. The F_1 hybrid of Delcrest x Virginia Gold has outyielded both parents but is slightly inferior to both in leaf quality. Strains developed at Ottawa with resistance to black root rot and mosaic require further selection for uniformity of type and quality. A strain of mosaic virus capable of inducing severe necrosis in tobacco carrying the $N'N'$ genes was found in Ontario; it also causes chlorotic mottle in types with a single N' factor. The virus gave rise to a mutant distinguishable from the parent form by differences in the degree of mottling on various hosts.

Linseed. Seven physiological races of *Melampsora Lini* obtained from different parts of Manitoba and eastern Saskatchewan were pathogenic on Dakota and Redwing, but none attacked Rocket, Redwood or Sheyenne. Rust resistant lines bred at Ottawa include an early maturing selection, 3901D, which has large seeds.

Apple. Resistance to scab is being sought among wild apples growing in the Ottawa district. During 1951, when scab was epidemic, two wild seedlings showed considerable resistance; they have been propagated for breeding purposes.

Strawberry. In a population of 10,514 seedlings tested at Saanichton, BC, only 68 hybrids showed resistance to red stele and remained vigorous through two growing seasons. All 68 hybrids have Magoon as one parent; this variety will therefore be included in future breeding programmes.

Melon. The programme of breeding for resistance to *Fusarium* wilt at Harrow, Ont., has resulted in two promising lines, 8–301 and 9–201. Both hybrids are productive and of good quality, but further tests are necessary before either can be released.

Tomato. L–3700 sel. I, developed from Farthest North x Polar Circle at Lethbridge, is to be released as Earlinorth. It is a very early variety, with fruit ripening 60 days after transplanting.

Lines resistant to late blight are still being sought for breeding purposes. A cherry-fruited tomato, T–5, introduced from New York State, has shown a higher degree of resistance than Selection 2 from the Philippines.

Bean. Attempts are being made to incorporate resistance to anthracnose, common blight, and halo blight in two field bean varieties, Clipper and Corvette.

992 ÁLVAREZ, V.
Dirección de Estaciones Experimentales. (Síntesis de su labor en 50 años de República). [**The Division of Experimental Stations. (Synopsis of its work in the 50 years of the Republic**)].
Rev. Agric., Habana 1951–52 : **35** : 56–77.

A general account is given of the organization of the agricultural research stations in Cuba, the first of which was founded in 1904. Among their achievements have been the production of a number of superior mosaic resistant sugar canes; the rehabilitation of the Havanensis tobacco by means of selection; the production of the maize variety Francisco distinguished by high quality, yield and resistance to drought and insects attacking the roots, a sweet corn variety Pajimaca suitable for the S. American tropics, and improved forms of sorghum, various tropical grasses and legumes, avocado, mango and other tropical fruits, kenaf and other fibre plants; and selection of large numbers of coffee seedlings.

993 **Annual Report of the Department of Science and Agriculture, Barbados for the year 1950-1951** : Pp. 68.

Details are given of maize trials, cotton selection work in progress at Codrington, and breeding and selection of sugar cane, with special reference to the release of B 4744 (cf. Abst. 1344).

994 **Report of the Director of the New Hampshire Agricultural Experiment Station, July 1, 1949-June 30, 1951.**
Sta. Bull. Univ. N.H. 1952 : No. 394 : Pp. 48.

Maize. Hybrids between dent maize and sweet corn were among those tested. They gave silage yields exceeding all those previously obtained; they were however a little late in maturing.

Red clover. A promising variety with perennial habit has been selected.

Rubus. A selection of *R. morifolius*, which has been named Korean Tree Berry, shows a high degree of winter hardiness and disease resistance; it is also vigorous and productive, bearing translucent, glossy, sweet-flavoured berries. It has been crossed with red, black and purple raspberries.

Two selections, 100 and 101, from the F_2 of a cross between the raspberry Taylor and *R. Chamaemorus* are to be distributed for trial. No. 100, an early ripening variety, produces branching plants about 30 ins. high. No. 101 grows about 4 ft. tall, and ripens in midseason, bearing large pointed fruits with good quality. Both selections have been outstanding for their hardiness and productivity.

Squash. A bush variety of the Buttercup type has been developed from a cross between Buttercup and Zapillito. Under conditions in New Hampshire, it matures in a shorter time than any other true squash with acceptable quality.

Beans. Several strains of green snap beans with white seeds have been distributed for trial. One strain, 57, produces flat pods of unusual length.

Seed of the early shell bean Shelleasy, developed from a cross between Littleton and Flash, is being increased. The new variety has pods with attractive red mottling.

Sweet corn. The yellow 8-rowed variety Cocheco has been selected from a cross between Fort Kent flint maize and the sweet corn Golden Gem. It has not yet been extensively tested, but appears to be earlier than any other sweet corn available. It resembles Golden Bantam in appearance but is not quite so good in quality.

995 **Science for the farmer. Sixty-fifth Annual Report of the Pennsylvania State College Agricultural Experiment Station.** 1952 : Bull. No. 553 : Pp. 68.

Cereals. Seed of the winter wheat Pennoll has been distributed (cf. *PBA*, Vol. XXI, Abst. 2567). Several high yielding strains in the cooperative soft red winter wheat nursery have exhibited good resistance to leaf rust; one of these strains has also shown resistance to Hessian fly.

The winter oat LeConte appears to be the best variety at present for southeastern Pennsylvania.

The barley Kenbar was released jointly by the Pennsylvania and Kentucky stations (cf. Abst. 1183).

Maize hybrids earlier than Oh. M 15 are required. Pa. 444 [(Pa. 54Q x Pa. 11) (Pa. 32 x Pa. 33)] has shown superiority over Wis. 412 in both yield and lodging resistance in two years of testing. Production of limited acreages of this hybrid and also Pa. 602A [(Ind. WF9 x Oh. 51A) (Pa. 54Q x W 22)] and Pa. 707 [(Ind. WF9 x Ill. Hy) (Pa. 54Q x W 22)] is to be undertaken.

Potato. Commercial varieties originally regarded as late blight resistant have all proved susceptible to race D. *Solanum demissum* has shown resistance to all six known races. It has been found that a combination of genes for immunity from races C and D provides immunity from all races. By appropriate hybridization, seedlings immune from all six races have been secured. Some of those seedlings have also exhibited scab resistance.

Tobacco. Two wildfire resistant strains of cigar leaf tobacco, grown under commercial conditions, equalled the control variety in yield and exceeded it in duration of burn. Lines resistant to mosaic or wildfire, and others resistant to both of these diseases were tested in comparison with Swarr-Hibshman. Most lines outyielded and outburned this variety; six of the best strains are to be further selected. The mosaic resistant lines were inferior to Swarr-Hibshman with respect to leaf shape and cured leaf quality.

Capsicum. F_1 peppers produced outstandingly good yields.

Lettuce. An F_8 selection of Great Lakes x Imperial 44 has given the best results in extensive tests; it has the head type of Imperial 44 and the solidity and heat tolerance of Great Lakes; its seed production is good. One F_3 involving Great Lakes, Imperial 44 and Imperial 456 remained free from tipburn as late as 5 July, and showed 80% uniformity in its production of large solid heads with flat shape and smooth erect leaves.

Tomato. The mutant character of male sterility discovered in John Baer has been transferred to varieties possessing good combining ability, with a view to facilitating the production of F_1 hybrid seed.

Other vegetables. F_1 eggplants and cucumbers gave a good performance.

Two adapted lines of the sweet corn inbred Purdue 39 have been developed. Line 48 is recommended as the female parent in producing the hybrid Penndale.

996 **Agriculture astride the century. Annual Report of the School of Agriculture, North Carolina State College, 1950-51** : Pp. 96.

Barley and oats. World collections of both cereals are being surveyed, with particular emphasis on finding sources of disease resistance. In greenhouse trials several barleys have exhibited a high degree of mildew resistance. Many lines of barley and oats have shown greater winter hardiness than varieties now commonly grown in North Carolina.

Maize. The yellow hybrids NC 24, NC 36 and Dixie 82 and white hybrids NC 29 and NC 31 were released (cf. *PBA*, Vol. XXII, Abst. 2658). Inbred lines resistant to *Helminthosporium Maydis* and others resistant to *Physoderma Zeae-Maydis* have been isolated.

Under conditions in North Carolina some stocks have shown complete male sterility, failing to produce anthers.

Sorghum. In trials during the past three years, new dwarf varieties of grain sorghum suitable for combine harvesting have given good results.

Forage legumes. A greenhouse technique of testing for resistance to crown and stem rot in lucerne and resistance to *Rhizoctonia* blight in trefoil has been devised. Lucerne seedlings about a month old are inoculated with the rot fungus and placed under a plastic tent, with the temperature of the greenhouse maintained at 65°. An electrically operated fog machine is used to keep the foliage moist. In the case of trefoil, the temperature of the greenhouse is maintained at 85°. A small number of lucerne and trefoil seedlings have survived the tests and are to be used in breeding.

Cotton. Interspecific chromosomal differences are being subjected to intensive analysis.

A 60% increase in fibre strength has been obtained in an Upland line derived from a cross with a wild relative from Arizona. A considerable amount of cross pollination has been detected, using finely powdered methylene blue; much of this hybridization was due to wild bees.

Tobacco. Further breeding for resistance to both blackshank and Granville wilt has been carried out.

Dixie Bright 102 has shown resistance to *Fusarium* wilt, in addition to resistance to the above two diseases; Dixie Bright 101 gave higher yields than older varieties in the 1950 tests and its quality was consistently high (cf. *PBA*, Vol. XX, Abst. 2514).

Groundnut. The use of X ray treatment as a means of obtaining useful variants is being explored. Some of the plants derived from treated material may be useful in breeding for leaf spot resistance.

Strains resulting from a first cycle of breeding have been extensively tested. Their advantages include improved resistance to leaf spot. Six of the new selections have been crossed to combine the highest yielding capacity possible with good quality; a second cycle of breeding has thus been initiated.

Chromosome behaviour and pollen development are being investigated in typical strains.

Grape. In muscadine breeding, promising perfect-flowered lines with high sugar content are the main objective. Promising seedlings have been obtained but further breeding is probably required to improve their fruit size and flavour. Tarheel and Topsail appear to be the best parents in breeding for vigour and disease resistance. Seedlings derived from Burgaw and Latham have yielded the sweetest fruit. Duplin and Topsail have been the best parents as regards fruit size. So far the best combinations have been Topsail x Tarheel, Thomas x Tarheel and Topsail x Burgaw.

Lettuce. Line NC 63, a type with crinkled leaves, is to be given field tests, since it has headed well and shown good uniformity and no tip burn.

Cantaloupe. Several varieties showed downy mildew resistance and will be used in breeding resistant cantaloupes suitable for commercial production in North Carolina.

Tomato. Lines with good field resistance to bacterial wilt have been developed, but only a few bear fruits of marketable size.

In greenhouse tests on bacterial wilt resistance, very young plants from resistant lines have exhibited greater susceptibility than older plants. Susceptible varieties were however highly susceptible at all ages. It was also found that resistant lines are more susceptible to stem than to root inoculations.

997 **Sixty-second and sixty-third Annual Reports of the South Carolina Experiment Station for the years ended June 30, 1949** (1950) : Pp. 112; and **1950** (1951) : Pp. 167.

Wheat. Release of the high yielding strain Y 2652 (Leapland x Fronteira) is being considered.

Potato. The scab and late blight resistant seedlings B 61–3 and B 73–10 show promise.

Sweet potato. Selections combining high yielding capacity, deep salmon flesh colour and resistance to internal cork virus have been produced, but further breeding is necessary to add other desirable characters. Allgold and the lines E 7, 11–20, 11–146 and 262–33 were resistant to internal cork when inoculated by the core-graft method.

Cotton. Progress has been made in developing early, high yielding strains with good spinning qualities. Asiatic and American cottons and *Gossypium Thurberi* were tested for their reaction to three *Fusarium races*, originating in the United States, India and Egypt. Several varieties of *G. arboreum* were resistant to all three.

Tobacco. Sel. 17 (Jamaica x 400) is a promising cigarette type; it is fairly resistant to nematode. Varieties resistant to Granville wilt and blackshank were subjected to quality tests. Where resistance to both diseases is required, Dixie Bright 101 is the best variety available.

Sesame. Most breeding lines possess some resistance to *Fusarium* wilt but further selection for this character is required.

Lettuce. A mosaic resistant variety of the Romaine type has been bred.

Cucumber. Santee, a variety moderately resistant to downy mildew, was released (cf. *PBA*, Vol. XX, Abst. 1217).

Cowpea. A yardlong bean from Cuba and a small-seeded type from the Philippines are highly resistant to powdery mildew; they have been crossed with edible types of cowpea.

998 **Annual Report of the Agricultural Experiment Stations, University of Florida, for the fiscal year ending June 30, 1951** : Pp. 277.

Cereals. Wheat, oat and barley breeding continued. Barley hybrids having Manchuria as a common parent were tested for disease resistance; a few promising selections were obtained. Oat crosses were made to broaden the genetic basis of crown rust resistance, and to combine resistance to this disease, stem rust, Victoria blight and culm rot.

Selfed lines of rye resistant to stem and leaf rust and to mildew were isolated.

Recurrent selection for specific combining ability in maize is in progress. Investigations are being carried out on cytoplasmic male sterility as a means of facilitating commercial production of hybrid seed.

Grasses. Selections of *Paspalum, Pennisetum, Panicum* and *Digitaria* species were tested for yield and other characters. Field experiments have been initiated to evaluate strains of *Cynodon, Digitaria* and *Paspalum* for disease resistance, variability between and within strains, and general desirability as forage types on sandy land. Ryegrass breeding to combine the best features of several selections in a variety suitable for seed production and grazing in North Florida has been initiated.

Velvet bean. Breeding continued.

Lupin. Selection was carried out for cold tolerance.

Cotton. The long staple variety Sealand 542 is under selection for increased lint strength and for freedom from neps in the ginned cotton.

Kenaf. Breeding has been initiated at the Everglades substation.

Sugar cane. Seedlings were further selected. Varietal resistance to borers is under investigation.

Tobacco. Two methods are being used to develop tobaccos combining nematode resistance and good leaf type: (1) recurrent selection; and (2) use of F_1 hybrids. In order to facilitate commercial production of the F_1 hybrid seed a factor for male sterility will be introduced into one parent of each cross.

At the North Florida substation, improvement of the blackshank resistant variety Rg was continued along two lines: (1) selection for disease resistance, cigar-wrapper type, yield, grade and fire-holding capacity; and (2) hybridization with other tobacco varieties and with *Nicotiana* spp. possessing nematode resistance or other desirable qualities.

Capsicum. None of the peppers introduced from India, Turkey and Syria showed immunity from tobacco and cucumber mosaic. Some tolerance was however observed, particularly of cucumber mosaic.

Tung. Some hybrid trees showed considerable tolerance of cold. *Aleurites Fordii*, *A. montana*, *A. cordata*, *A. trisperma* and *A. moluccana* differed widely in the α-eleostearic acid content of their oils. Seedling trees have consistently given higher yields of fruit than budded trees of the same variety.

Guava. Hybrid seedlings have been produced yielding large fruit with considerable acidity and a range of flesh colour from white to salmon and several shades of red.

Groundnut. The variety Early Runner (Dixie Giant x Small White Spanish) was released (cf. *PBA*, Vol. XXII, Abst. 1416).

Breeding is being carried out to develop lines combining the pod and seed characters of the Spanish groundnut with the plant habit of the runner type.

Stock of Fla. 281 (Spanish-Valencia x Virginia Bunch), a strain with medium large seed, is being increased for processing tests by confectionery manufacturers.

Celery. Emerson Pascal, a *Cercospora* blight resistant variety with finely cut foliage, was released (cf. *PBA*, Vol. XXII, Abst. 2297).

Cantaloupe. Some F_3 plants from the cross Smith Perfect x Powdery Mildew Resistant 5 were highly resistant to both downy and powdery mildew.

Water melon. F_2 lines of the Garrison, Congo and Cannon Ball (Black Diamond) types possessing combined resistance to *Fusarium* wilt, anthracnose and downy mildew have been obtained. The wilt resistant variety Ironsides was released (cf. Abst. 1545). Line 1042–01–01, a small-fruited watermelon of the Cannon Ball type, has poor internal quality, but should prove useful in breeding on account of its earliness and *Fusarium* resistance. Another line of the same type, but with larger fruit, has been named Orton; it shows promising quality, earliness and wilt resistance, but requires further purification.

Tomato. Some stocks possessing combined resistance to *Alternaria*, *Stemphylium*, *Fusarium* and *Cladosporium* have shown better fruit quality than any other tomatoes available. Promising stocks fixed for combined resistance to *Cladosporium*, *Stemphylium*, *Fusarium* and mosaic were isolated.

Eggplant. Two *Phomopsis* resistant varieties have been developed, Florida Market and Florida Beauty (cf. *PBA*, Vol. XXI, Abst. 2249).

Snap bean. Progress in breeding for rust, mildew, mosaic resistance and other characters is reported.

999 **58th and 59th Annual Reports of the Agricultural Experiment Station, Alabama Polytechnic Institute, January 1, 1947-December 31, 1948** : Pp. 59.

Crimson clover. The strain Auburn Reseeding was released (cf. *PBA*, Vol. XVIII, Abst. 265).

Cotton. The new wilt resistant strains 1282 (Stoneville 2A x Clevewilt) and CSS 9 [(Clevewilt x Stoneville 2B) x Stoneville 2B] have given promising results. Strain 9531 is being used in breeding for high tensile strength.

1000 **Agricultural research in Texas, 1950.** Texas Agric. Exp. Sta. 1950 : Pp. 71.

Wheat. Several selections from crosses between Sinvalocho, Wichita and Hope-Cheyenne have significantly outyielded Wichita and shown a high degree of resistance to leaf and stem rusts. Quanah (cf. *PBA*, Vol. XXI, Abst. 973) and Supremo (Surpreza x Mediterranean-Hope), two rust resistant varieties with flour of good quality, have been released. Supremo lacks winter hardiness and is therefore recommended for southern areas only.

Oats. Breeding for increased winter hardiness is surveyed, with special reference to the release of Mustang (cf. *PBA*, Vol. XXI, Abst. 1791). Another strain, 73–44–90, suitable for spring sowing in northern Texas and autumn sowing in southern regions, has been developed from Victoria-Hajira-Banner x Fulghum-Victoria; it is resistant to stem and crown rusts and has outyielded Fultex by 20% at Denton.

Breeding for resistance to *Helminthosporium* blight continued.

Maize. Large scale development of male sterile inbreds for release to seed growers to facilitate production of hybrids is under way. The characteristics of a newly developed yellow hybrid, Texas 30, are outlined (cf. *PBA*, Vol. XXII, Abst. 1135).

Barley. Breeding is in progress to combine disease and insect resistance with winter hardiness in a smooth-awned variety. A selection from Winter x Texan 8–43–311, with mildew resistance, smooth awns and the winter hardiness of Wintex, has compared well with commercial varieties in recent yield trials and may be released for central and north-central Texas.

The distribution of Goliad is reported (cf. *PBA*, Vol. XXII, Abst. 2724).

Sorghum. Transference of male sterility to lines possessing desirable agronomic characteristics is being carried out to provide an easier means of developing sorghums with hybrid vigour. The hybrid Texas Blackhull Kafir (male sterile) x Day Milo has consistently outyielded its kafir parent by 39% and Martin by 62% at Chillicothe.

Other characters which are being incorporated in new combine types include: tough rind to minimize lodging; short glume, covering less than one-fourth of the seed, to facilitate threshing; and temporary bitterness of the seed which disappears at maturity but is sufficient to discourage birds.

New varieties released during the season comprise Combine Kafir 60, Redbine 60, Redbine 66, Hi-Hegari and Pop-sorghum (cf. *PBA*, Vol. XX, Abst. 2369 and Vol. XXI, Absts. 343 and 2672).

Rice. Descriptions are given of varieties recently released, including Bluebonnet 50, Improved Bluebonnet, Texas Patna and Century Patna (cf. *PBA*, Vol. XVIII, Abst. 1351 and Vol. XXI, Abst. 1691). A new late maturing selection, Texas Patna 49, is being widely tested.

Forage grasses. Trials of numerous species are reported. Hybridization has been continued with the aim of developing a disease resistant perennial Sudan grass, with nonaggressive rhizomes, which produces early spring growth. Some hybrids obtained between native strains of buffalo grass have superior seed stalk length; isolated crossing blocks have been established from promising selections.

Forage legumes. Trials of numerous species have included 136 foreign introductions.

Cotton. Results of cytological analyses of interspecific hybrids involving cultivated American Upland varieties and wild species suggest that failure of species to cross directly is not always a reliable criterion of their relationship. Some complex aneuploids have been developed. Varieties which have yielded well in particular environments are listed.

Oil seeds. Adaptability trials of strains of castor bean, sesame, sunflower and safflower were conducted in various localities. Breeding for nonshattering strains of sesame has been initiated.

Fruits. Trials are reported on apple, plum, peach, citrus, strawberry and grape varieties.

1001 **Sixty-third Annual Report of the University of Tennessee Agricultural Experiment Station for 1950** : Pp. 149.

Maize. New white hybrids showing particularly good yields and lodging resistance are under test.

Grasses. Breeding is being carried out on Kentucky bluegrass, tall fescue, smooth brome, Harding grass, cocksfoot and little canary grass.

Tobacco. Mosaic or blackshank resistant selections were backcrossed on the dark fire-cured type Madole 1. Promising burley lines with combined resistance to wildfire, mosaic and black root rot have been developed. An attempt is being made to develop blackshank resistant burley varieties from crosses with resistant cigar wrapper and flue-cured types, and from interspecific crosses.

Pear. Progress is reported in breeding for fire-blight resistance.

Rubus. Two African forms of *Rubus* resistant to anthracnose were crossed with American varieties of black raspberries. Blackberry crosses are under investigation. Good pollination has been obtained with Early King on Boysenberry and Dallas, Ozark Beauty on Early King and Dallas, and Dallas on Boysenberry.

Strawberry. The variety Tennessean was introduced (cf. *PBA*, Vol. XXI, Abst. 1354). Tennessee Shipper x Sparkle and Tennessean x Blakemore have yielded many valuable selections.

Tomato. *Solanum capsicastrum*, a species of possible value in breeding, was immune from late blight but susceptible to buckeye rot (*Phytophthora parasitica* var. *terrestris*).

Phaseolus. Lines from crosses between *Ph. lathyroides* and *Ph. vulgaris* show resistance to leaf spot and rust.

1002 Fifteenth Biennial Report of the Director of the Kansas Agricultural Experiment Station for the biennium July 1, 1948, to June 30, 1950 : Pp. 122.

Wheat. The dwarf-bunt resistant strain 47B8 (Marquillo-Oro x Oro-Turkey-Florence) is under extensive test. Promising stem rust resistant selections, resembling Pawnee, have been developed from Mediterranean-Hope x Pawnee. In addition to hybrids from common wheat crosses, selections of Marquillo-Oro x *Triticum Timopheevi* and *T. vulgare* x *Agropyron trichophorum* back-crossed to *T. vulgare* have been tested for resistance to many races of leaf and stem rust. Resistance was no better than that obtained from intervarietal crosses of common wheat; moreover, many unsatisfactory characters appeared in the progenies of the wider crosses.

The strains CI 12128 (Kawvale-Marquillo x Kawvale-Tenmarq) and CI 12133 (Chiefkan x Oro-Tenmarq) are being increased for possible release. The former is more resistant to Hessian fly than Pawnee.

Genes for a high degree of Hessian fly resistance have been transferred from an introduced spring variety of *T. durum* to common hard red winter wheats.

Evidence has been obtained suggesting that spring hardiness, like hardiness during mid-winter, is heritable, and that these two forms of hardiness are probably inherited independently.

Oats. New sources of resistance to Victoria blight and race 45 of crown rust are being used to increase the disease resistance of adapted varieties.

Maize. The following high yielding, drought resistant hybrids are recommended for commercial growing: the mid-season yellow hybrid K 1646, particularly suitable for mechanical harvesting; the white, full season hybrid US 523W (K 2299); and the early yellow hybrid K 1859, which has given an outstandingly good performance in the western and northeastern areas of Kansas.

Barley. Winter barley breeding has been initiated.

Sorghum. Strains resistant to smut and chinch bug and suitable for combine harvesting are being selected from Spur feterita-Blackhull x Club-Day.

Grasses. Polycross tests are being carried out on selections of big and little bluestem, reed canary grass and brome grass. Crossing among 4*n* Sudan grass strains and 4*n* Johnson grass hybrids was effected; many lines resistant to foliar diseases and chinch bug were secured. Selected clones were tested for HCN content.

Lucerne. Resistance to *Pseudopeziza Medicaginis* is probably dominant to susceptibility.

1003 Agricultural research in South Dakota. Sixty-fourth Annual Report of the South Dakota Agricultural Experiment Station, July 1, 1950 to June 30, 1951 : Pp. 141.

Cereals. The release of the winter rye Pierre is reported (cf. *PBA*, Vol. XXII, Abst. 326).

The yellow maize hybrids South Dakota 262 [(SD 6 x Oh 56A) (SD 5 x M 14)] and South Dakota 270 [(SD 7 x Oh 56A) (SD 5 x M 14)], with maturity ratings of 98 and 100 days, respectively, were released.

Forage crops. The brome grass Homesteader, composed of five well-adapted strains, is superior in forage and seed yields and palatability (cf. *PBA*, Vol. XXII, Abst. 1978).

Several selections of lucerne with inherited resistance to leaf spot diseases have been isolated. Nine plants with an inherent capacity to spread by lateral extension of true roots underground were discovered in a mixed hybrid population. These plants, differing in flower colour, leaf characters, response to day length, self and cross fertility and chromosome number, were intercrossed. The progenies thus obtained and selfed progenies are now under investigation; a synthetic variety is to be developed.

Improvement of birdsfoot trefoil and sweet clover is under way.

Tree fruits. Apricot seedlings obtained by crossing hardy Siberian trees with pollen stored under refrigeration for two years are being studied. Promising apples and pears have been selected. Improved cherries and sand cherries are also being developed. Breeding stocks collected by N. E. Hansen include fire blight resistant pears.

Tomato. The hybrid Siouxann was released. Crosses of commercial varieties with wild *Lycopersicon* spp. were further selected for resistance to *Septoria*.

Sweet corn. New early single hybrids are under test.

1004 **Notes on current investigations, January to March, 1952.**
Malay. Agric. J. 1952 : **35** : 105–15.

Rice. Numerous selections of Serendah Kuning have been undergoing trial in comparison with unselected strains in several localities; both Serendah Kuning 3 and Serendah Kuning 56 have shown particular promise.

Some 70 new crosses have been effected at Kuala Lumpur. F_1 hybrids from 13 crosses produced sufficient seed for an F_2 generation to be grown for adaptability trials at Pulau Gadong, Malacca.

Cacao. Observations on introductions from the East Indies and West Africa have continued (cf. *PBA*, Vol. XXII, Abst. 2558). Further introductions from West Africa include clones originating from the Upper Amazon and *Herrania* spp.

Oil palm. The dumpy strain E 206, although still giving high oil yields, has been outyielded by the hybrid seedling E 152 x E 206.

Pineapple. Considerable variability has been noted in the growth habit of the Singapore Canning variety in Johore. Six types, differing in compactness, have been selected for trial at four centres.

Soya bean. Some 40 single plant selections have been made from recent introductions from Java.

1005 **Twenty-sixth Annual Report of the Department of Scientific and Industrial Research, New Zealand 1952** : Pp. 84.

Wheat. Progress is reported in breeding mildew resistant strains of Cross 7, Yielder and Hilgendorf. Analysis of the inheritance of quantitative characters continued. Experimental work on the inheritance of resistance to shattering has been completed.

Oats. The Welsh variety S225 was the only variety not subject to lodging on heavy land. The variety is being tested for yield and milling quality; its value in crosses is also being explored.

Barley. Tests of the yield and quality of Scandinavian varieties continued.

Grasses. Further breeding was carried out on ryegrass, cocksfoot and timothy. The possibility of developing a perennial ryegrass strain resistant to blind-seed is being explored. The successful performance of short-rotation (S/R) ryegrass, bred to fill the gap between perennial and Italian ryegrasses, is discussed.

Forage legumes. Grazing and hay types are being improved. Breeding with white and red clover continued. Variation in *Lotus uliginosus* and *L. corniculatus* is being investigated. In an attempt to facilitate hybridization between these two species, *L. uliginosus* was treated with colchicine to double the chromosome number.

Lupin breeding is in progress to combine the rapid early development of the bitter pink lupin with the low alkaloid content of New Zealand sweet white lupins and of the Swedish sweet blue variety Borre.

Swede. Calder, Vilmorin's White Flesh Green Top, Balder, Granshovsdet Hunsballe, Bangholm Wilby Øtofte, and lines of Wilhelmsburger Øtofte and Vilmorin's White Flesh Purple Top showed fair resistance to aphid. Some lines of Wilhelmsburger Øtofte exhibited promising resistance to dry rot.

The nature of aphid resistance is being studied. As young leaves are more susceptible than mature ones, possibly the soluble nitrogenous compounds in actively growing tissue may be essential for maximum aphid development.

Rape. Further selections of (Calder x Superlative) x Clubroot Resistant succumbed to aphid attack at a young stage; other hybrids are being studied for aphid resistance.

Potato. Suitable hybrids have been introduced as material for breeding for resistance to viruses X and Y and late blight.

Flax. The back-crossing programme to introduce the rust resistance of Russian varieties, Ottawa 770B and Bombay to Liral Crown has been extended to Concurrent, which has given reliable yields.

Linseed. Selection of Redwood, Rocket and Plate for rust resistance has been initiated. The rust resistance of Cheyenne and Bombay is being transferred to Golden Viking by back-crossing. Rust resistant selections from hybrids with Cheyenne are being further selected for early maturity to secure a substitute for Bison in Southland.

Carrot. Holmes Improved is under selection for more desirable market type.

Broccoli and Savoy cabbage. Selection and breeding continued.

Tomato. Breeding is to be carried out for a combination of earliness and high yield.

Peas. Early garden peas with higher yielding capacity than William Massey and mosaic resistant Greenfeast types have been developed. They show a range of maturity dates and are to be subjected to canning trials. Breeding for wilt resistance in garden and field peas continued. New lines of blue field peas are under test.

1006 Departmental handbook of the New Zealand Department of Scientific and Industrial Research, 1952 : Pp. 68.

A general survey is made of the establishment and activities of all research stations of the department, providing in a concise form much information previously available only from separate sources. The handbook briefly mentions breeding programmes and varietal trials already recorded in reports of the following: the Wheat Research Institute, the Crop Research Division, the Grasslands Division, the Tobacco Research Station, the Hop Research Station, the Fruit Research Station and the Plant Diseases Division.

1007 Third Annual Report of the Commonwealth Scientific and Industrial Research Organization, Australia, for the year ending 30th June, 1951 : Pp. 167.

Adaptability trials have been carried out in different parts of Australia with forage and oil plants introduced from 33 countries.

Forage grasses and legumes. Aqueous colchicine (0·4%) has been used to double the chromosome complements of numerous common forage grasses and legumes. Most of the autopolyploids showed reduced vigour compared with their parent species.

Assuming that certain gene mutations might increase the range of adaptability of common pasture plants, seeds of numerous species have been treated with chemical mutagens and X ray doses of 10,000–20,000 r. Survivors are under observation.

Several new selections of subterranean clover have shown promise at the Glen Lossie Field Station, WA. A strain from Victoria known as Port Fairy showed good reestablishment in the autumn and appears well-suited to local conditions.

Potato. Inheritance of resistance to mosaic, leaf roll and spotted wilt viruses has been studied in various hybrid progenies. A wide range of reaction to leaf roll has been observed, using the degree of phloem necrosis as an index of severity. In field trials Katahdin has shown a high degree of resistance to spotted wilt. Phenotypic reactions of seedlings were successfully determined under greenhouse conditions by a modified technique in which young growing tips, instead of leaves, were inoculated with spotted wilt virus.

Results of inoculating several hybrids from Scotland and Canada with eight isolates of *Phytophthora infestans* from different parts of Australia gave no evidence that more than one strain of the pathogen was present.

Tobacco. Mosaic resistant lines of flue-cured varieties from the USA have been undergoing trial in connexion with the breeding programme at Ayr, Qd.

A definite correlation has been observed between the age of a leaf and its shape and total area. Differences between the size of successive leaves therefore give a quantitative measure of the rate of aging; and shape, being related to the maturity of the plant, can be used as an index of the stage of development. Selection of early or late maturing plants at the seedling stage is thus facilitated.

Duboisia. Analyses of atropine and hyoscine content of native strains of *D. myoporoides* and *D. Leichardtii* and their interspecific hybrids were continued (cf. *PBA*, Vol. XXII, Abst. 209). A few *D. myoporoides* strains of northern origin have consistently given higher yields of hyoscine than other northern types; four promising clones have been selected. Additional plant collections were also made in the area from which these superior strains originated. Considerable variation in vegetative characters has been found among southern types.

All F_1 hybrids of *D. Leichardtii* crossed with northern or southern strains of *D. myoporoides* have proved more vigorous than either parent species. The F_2 of northern *D. myoporoides* x *D. Leichardtii* has shown outstanding vegetative vigour.

Peach. Evidence of considerable variation in quality of certain freestone types from season to season has been obtained in canning trials. Halehaven, Blackburn and Success are recommended for consistent high quality, while J. H. Hale, Viceroy, Elberta Dripstone, Elberta Cling, Gray's and Fragar are generally satisfactory for processing.

Tomato. A virus-inactivating mechanism sensitive to temperature is considered responsible for the varied degrees of resistance to spotted wilt shown by *Lycopersicon pimpinellifolium*, *L. peruvianum* and Rey de los Tempranos [King of the Earlies].

Under the conditions of the Murray Valley, a *L. esculentum* x *L. peruvianum* hybrid from Davis, Calif., has maintained a high degree of eelworm resistance. Crosses are in progress to combine this resistance with the characteristics of local commercial varieties.

Pea. Two virus isolates resembling bean mosaic II have been used to distinguish resistant hybrids among progenies of crosses involving Greenfeast, William Massey and Canners' Perfection. Segregation ratios indicate that a single major gene may be responsible for resistance.

1008 SMITH, H. C.
Annual Report of the Department of Agriculture, Tasmania, for 1949-50 (1950) : Pp. 44.

Wheat. Hybridization continued. Selection 37/2101 (Sutton x Braemar) was graded first in tests of suitability for biscuit manufacture.

Pasture plants. Cocksfoot, crested wheatgrass, perennial and Italian ryegrass and subterranean clover are being selected.

Potato. Promising hybrid selections are under observation.

Fruits and vegetables. Strawberry, raspberry, black currant and tomato breeding is briefly reported.

1009 Un verdadero éxito fué la II reunión latinoamericana de fitogenetistas y fitoparasitólogos en el Brasil. (**The second Latinamerican congress of plant geneticists and phytopathologists in Brazil was a real success**). Idia 1952 : No. 54 : 2–9.

The work of the three Brazilian institutes at which the congress was held, the Instituto Biológico de São Paulo, the Escola Superior de Agricultura Luiz de Queiroz and the Instituto Agronómico de Campinas, is outlined briefly, after which an account is given of the proceedings of the congress and the papers presented. These included the following:—

Graner, E. A. A posição do gen y^3 *no cromossomo 2 do milho. (The position of the gene* y^3 *on chromosome 2 of maize). (p. 6).*

The gene y^3 is located on chromosome 2, 7 units away from lg^1, the order being y^3–lg^1–gl^2.

Wellhausen, Wortman and Prywer. Relación entre el número de nudos cromosómicos y la habilidad combinatoria en líneas de maíz. (Relation between chiasma number and combining ability in maize). (p. 6).

The relationship varies according to the origin of the lines.

Dias, M. Melhoramento do repolho louco. (Improvement of the common cabbage). (p. 6).

Two years of selfing followed by crossing between the selfed lines led to improvement in a local population.

Brieger, G. Comparação entre as raças de milho indígena da América Central e da América do Sul. (Comparison between indigenous maize races of Central and South America. (p. 6).

The comparison leads to the conclusion that Mexico can only be regarded as a secondary centre of origin of maize.

Cunha. Influencia da polinização no desenvolvimento dos frutos de "Vanilla planifolia *Andrew." (Influence of pollination on the development of fruits in* V. planifolia *Andrew). (p. 6).*

The size of the pods was increased when this species was pollinated with *V. baiana*, without there being any reduction in content of vanillin and other aromatic compounds.

Langham. Progreso en el desarrollo de sésamo indehiscente. (Progress in the development of indehiscent sesame). (p. 6).

Various mechanisms which reduce seed shedding and may be of use in breeding nonshedding varieties of sesame were described.

Wellhausen, Wortman and Espinoza Ochoa. La importancia de la autofecundación después de la primera generación en el maíz. (The importance of selfing after the first generation in maize). (p. 6).

When working with adapted local varieties no increase in combining ability was obtained after the first generation.

Krug et al. *Café "Mundo Novo." (New World coffee). (p. 6).*

The origin and qualities of this coffee, of which selected progenies are being multiplied, were described.

Bazán de Segura. Investigaciones sobre resistencia de especies, variedades e híbridos de papa al Phytophthora infestans *en el C.N.I.E.A. "La Molina,"* 1951. *(Investigations on resistance of species, varieties and hybrids of potato to* Ph. infestans *at the CINEA La Molina,* 1951). *(p. 6).*

The most promising material comprised 22 lines from *Solanum Antipoviczii* x *S. andigenum* and *S. demissum* lines DGV 020, 032 and 038.

De Sousa and Groszmann. A importancia da análise tecnológica da fibra no melhoramento do algodão. (The importance of technological analysis of the fibre in cotton breeding). (p. 7).

The fibre properties were influenced by year, locality and variety, in that order.

At the final plenary session of the congress plans were presented for the conservation of germplasm in maize, wheat and potatoes.

1010 Åkerman, Å.
Svenska jordbrukets växtodling. Aktuella problem och en utblick för framtiden. (**Plant cultivation in Swedish agriculture. Problems of the moment and a glance at the future**).
LantbrVeckan 1951 : 14–41.

In this address the recent advances in agricultural production in Sweden were reviewed with due recognition of the role played by plant breeding in the production, not only of higher yielding crop plants of superior quality, but even new types and species by polyploidization.

1011 Nohe, E.
Zu Entwicklungstendenzen in der Pflanzenzüchtung. (**On trends in plant breeding**).
Saatgutwirtschaft, Stuttgart 1952 : **4** : 112, 140–41.

Suggestions are made as to how a closer link between scientific discoveries and practical requirements might be ensured in the German Federal Republic. An efficient information service and instruction of the staffs of plant and seed breeding firms by talks and discussions should be promoted.

1012 Swaminathan, M. S.
Polyploidy and plant breeding.
New Biol. 1952 : No. 13 : 31–48.

A general account is given of autopolyploids and allopolyploids and of their practical significance in crop improvement.

1013 Creación de la División de Inmunología Vegetal y sus funciones. (**Creation of the Plant Immunology Division and its functions**).
Hoja Inst. Fitotécn., B. Aires 1945 (1952) : No. 1 : Pp. 7.

The programme of this new section of the Argentine Ministry of Agriculture includes the search for resistant varieties of crop plants, the constitution of a catalogue of resistant genes and of a collection of resistant varieties, the study of the biotypes of the pathogens in Argentina and research on the genetics of resistance.

1014 Boerger, A.
Genética de la inmunidad vegetal en el Río de la Plata. (**Genetics of plant immunity in the River Plate area**).
Arch. Fitotéc. Urug. 1952 : **5** : 55–93.

A very full review is given of the literature on breeding for disease resistant plants in the Río de la Plata area. The plants are considered in groups, starting with wheat and passing to the other cereals; flax, sugar cane and potato; and finally lucerne and forage grasses.
The achievements mentioned include the study of the physiological forms of the main rust species and the breeding of wheat, oat and ryegrass varieties resistant to them; the production of wheats resistant to *Ustilago Tritici*; of wheat, rye and ryegrass resistant to green aphid; bitter maize resistant to locust; linseed resistant to *Fusarium* wilt and a dual-purpose flax resistant to *Septoria Lini*; sugar canes resistant to smut; lucerne resistant to the stem nematode and cucurbits resistant to *Diabrotica speciosa*.

1015 Banco de genes de resistencia a las enfermedades de las plantas. (**Bank of genes for resistance to plant diseases**).
Idia 1952 : No. 54 : p. 9.

Reference is made to a depository of living material of agricultural plants containing valuable genes for disease resistance, under the charge of J. Vallega, División de Inmunología Vegetal, Ministerio de Agricultura y Ganadería, Buenos Aires, República Argentina.

1016 Packard, C. M. and Martin, J. H.
Resistant crops, the ideal way.
Yearb. US Dep. Agric. 1952 : 429–36.

A popular survey is given of the occurrence of insect resistance in crop varieties in the United States and of selection and breeding for this character.

1017 Linkola, O.
Lajikeryhmittely käytäntöä palvelemaan. (**A classification of varieties for practical needs**).
Keotoiminta Käytäntö 1951 : **8** : No. 10 : 3–4.

In order to help farmers in Finland to choose suitable varieties, a committee of the Central Union of Agricultural Societies has divided crop varieties into the following four groups: (1) new varieties bred in Finland and approved by the trade, and imported varieties undergoing trials; (2) general or standard varieties, the value of which has been widely demonstrated by the results of experiments and practical experience; (3) local varieties which have proved their worth in certain areas; and (4) new and other varieties not suitable for inclusion in the preceding groups.

1018 **What to plant in 1952.**
Bull. Va Agric. Exp. Sta. 1952 : No. 450 : Pp. 35.

The results of variety trials of wheat, oats, barley, maize, cotton, tobacco, groundnut and soya bean are summarized.

1019 Cooke, H. L., Peedin, C. D. and Moore, R. P.
Measured crop performance.
Bull. N.C. Agric. Exp. Sta. 1952 : No. 379 : Pp. 43.

On the basis of results of trials carried out in different parts of North Carolina during 1951, varieties of wheat, oats and barley, maize hybrids and cotton strains are recommended for particular areas.

CEREALS

1020 **The range of varieties of oats in the Netherlands.**
Windmill, The Hague 1952 : No. 8 : 20–21. (also in French, 18–19; German, p. 22 and Spanish, p. 23).

New varieties of winter crops in the Netherlands.
Ibid. 1952 : No. 8 : p. 21. (also in French, p. 19; German, 22–23 and Spanish, p. 23).

Descriptive notes are given on recommended oat varieties.

The new winter ryes Dominant and CIV 44/36 and winter wheat Mado are to be included for the first time in the List of Varieties of Field Crops for 1953. Dominant appears to be most suitable for reasonably good sandy and sandy peat soils, and also for clay soils. In recent years it has produced higher yields on these types of soil than Petkus. The main advantage of CIV 44/36 is its eelworm resistance. It has greater yielding ability and stiffer straw than Ottersumse. On soils free from eelworm, its yield compares unfavourably with that of Petkus. Mado ripens rather late, at about the same time as Staring. In trials it has given somewhat higher average yields than Staring, but is more susceptible to rust. The grain is red, with good quality. The winter hardiness of Mado is probably mediocre.

1021 **Conference of cereal breeders and geneticists held at Wagga, N.S.W., July 1951.**
Commonw. Sci. Industr. Res. Organ. Melbourne 1952 : Pp. 160. (Mimeographed).

Macindoe, S. L. Economic results of cereal breeding in Australia. (pp. 11–22).

In surveying the economic results of cereal breeding undertaken by the state departments of agriculture, data on yield trials and variety acreages are cited to show the popularity of improved varieties of wheat, oats and barley, but the lag between the development and widespread adoption of economically superior varieties is deprecated.

Raw, A. R. Review of cereal breeding in Victoria. (pp. 23–25).

An assessment is given of the contribution made to cereal production in Victoria by the varieties of wheat, oats and barley developed at the State Research Farm, Werribee (cf. *PBA*, Vol. XVIII, Abst. 144). The review gives some indication of the organization of research and procedure for testing selections.

Miles, L. G. Recent developments in winter cereal breeding in Queensland. (pp. 25–27).

Resistance to stem and leaf rusts has been the major objective of wheat hybridization at the Hermitage Regional Experiment Station on the Darling Downs, and the back-cross technique has also been used to incorporate rust resistance in otherwise agronomically desirable local varieties. Since Kenya C 6042 is susceptible to the new physiological races of rust, greater use is being made of Lawrence [Florence x College (= Hope)] and other varieties with mature plant resistance for breeding.

Alterations in baking methods have modified the gluten quality requirements, so that a Gabo type may replace Pusa 4 as the standard for comparison.

Oat selections with a high degree of resistance to crown rust have been made from Victoria x Richland, Fulghum x Victoria, Klein 69B and (Bond x Victoria) x Hajira; they are undergoing grazing tests in various conditions.

Waterhouse, W. L. Some aspects of wheat rust problems in Australia. (*pp. 28–33*).

Changes in the relative prevalence of physiological races of black stem rust and leaf rust are traced and reference is made to their effect on breeding programmes. It is pointed out that the absence of alternate hosts in which hybridization might occur has restricted the number of races in Australia; those races which exist probably arose by mutation.

Pugsley, A. T. Resistance of wheat to Puccinia graminis tritici. (*pp. 33–37*).

Descriptions are given of two new varieties, EWG and White Federation 50, developed at the Waite Agricultural Research Institute, South Australia, each incorporating a number of genes for stem rust resistance. EWG combines the mature plant resistance of Warigo with the physiological resistance of Eureka and also carries an additional gene for resistance obtained by crossing 6543 (Warigo x Eureka) with Gabo. The F_2 of EWG x Ranee gives a ratio of 15 resistant : 1 susceptible with respect to race 126, and a 3 : 1 ratio with race 126B. In White Federation 50, the genes for stem rust resistance possessed by White Federation 45 [Eureka x White Federation 38 (derived from Hope)] are combined with the resistance of Gabo, so the new variety is resistant to both 126 and 126B.

In connexion with the need for world coordination of genetic research on stem rust resistance, stressed at the 1950 Conference at St. Paul, Minn. (cf. *PBA*, Vol. XXI, Abst. 1779), attention is drawn to the confusion in the nomenclature of genes for rust resistance; some coordination to establish universal symbols for those genes already identified is advocated.

Single, W. V. Wheat rusts. (*pp. 38–40*).

In the breeding programme of New South Wales, no stem rust resistant selections are rejected on grounds of susceptibility to leaf rust. Kenya C 6041, Kenya 117A, Hope, Marquillo, Acme and *Triticum Timopheevi* are the main sources of stem rust resistance.

The pedigree breeding system is used at all centres except Glen Innes where head selections are often made from bulk sowings. The heads may be sown immediately, before the end of December, so that an extra generation is achieved.

Debrett, P. H. Wheat stem rust. (*pp. 40–42*).

Stem rust resistance is the main aim of wheat breeding in Victoria. Lines homozygous for mature plant resistance have been obtained from crosses involving Thatcher, Celebration, Renown, Wariga, Hofed and *Agropyron intermedium*; many also give high yields and are of good quality. The more promising lines are being used, with Insignia and Quadrat, as recurrent parents in a programme of backcrossing to incorporate the physiological resistance of Kenya C 6041, Kenya 117A, Egypt, Marquillo 724, Marquillo 787, Bockvelt, Steinwedel x Khapli, and two derivatives of *Triticum Timopheevi*, 1656 and 1657.

Pugsley, A. T. Wheat diseases other than rusts. (*pp. 43–46*).

The progress of breeding for resistance to bunt, loose smut, flag smut and powdery mildew in Australia by back-crossing is reviewed.

Shaw, D. E. Some aspects of the wheat-attacking septorias in Australia. (*pp. 47–48*).

Using the collection of *Triticum* spp. and other related genera maintained at the University of Sydney, no physiological specialization has yet been demonstrated in isolates of *Septoria nodorum* or *S. Tritici* from different parts of Australia.

Symes, K. J. Wheat resistance to diseases other than rusts. (*pp. 48–49*).

Sources of resistance to flag smut, bunt and *Septoria* in New South Wales are listed. Although Abou Fashi, Flèche d'or [Golden Arrow] and Nebraska 28 are immune from *S. Tritici*, the following difficulties have restricted their use for breeding purposes: (1) the sterility of Abou Fashi hybrids; (2) the clumped growth habit of Nebraska 28 hybrids; and (3) the low number of resistant segregates from Flèche d'or.

Debrett, P. H. Wheat resistance to diseases other than rusts in Victoria. (*pp. 49–51*).

The breeding programme for flag smut resistance is outlined; it involves testing all hybrid material for reaction at Mallee Research Station, Walpeup. Resistance to root rot was shown by wheat x rye and wheat x *Agropyron* intergeneric hybrids.

Single, W. V. Cold resistance and recovery from grazing of wheat. (*pp. 52–57*).

A general survey indicates that varieties differ in their reaction to low temperatures, particularly in the early growth stages. It is suggested that the decreased winter hardiness shown by disease resistant varieties recently developed in New South Wales constitutes an undesirable trend in the breeding programme. The use of equipment to create low temperatures during seedling selection is advocated.

There is evidence that late maturing varieties withstand grazing better than early varieties.

Raw, A. R. Pure seed production. (pp. 58–61).

The influence of natural crossing and mutation of genes or chromosomes on the varietal purity of wheat, oats and barley is discussed.

Krause, M. R. Baking quality. (pp. 65–68).

Recent yield trials of wheat in South Australia show that yield need not be sacrificed when grain of good quality is grown. Since breeders debate the possibility of further yield improvements, closer attention to flour quality and the establishment of standard quality groups are advocated.

Farquhar, A. J. Baking quality in South Australian grown wheat. (pp. 69–70).

Varietal differences in respect of baking quality of wheats are discussed.

Martin, R. H., Meers, A. J. and Single, W. V. Wheat baking quality—breeding work of the New South Wales Department of Agriculture. (pp. 70–71).

Although the Pelshenke test for flour quality is still a valuable method for selection in early generations, use has recently been made of a lactic acid sedimentation test, indicating both quality and quantity of protein. The new technique can be carried out using a very small sample, without the manipulative error associated with the Pelshenke tests.

Raw, A. R. Breeding wheat for milling and baking quality in Victoria. (pp. 71–74).

The two main phases of the breeding programme comprise (1) hybridization between local types and better quality varieties from other Australian sources and overseas, and (2) a back-crossing scheme, being undertaken in conjunction with breeding for stem rust resistance, to incorporate the qualities of imported wheats in existing local varieties.

McMillan, J. R. A. Yield investigations. (pp. 75–76).

Statistical methods, used by the Genetics Section of the Division of Plant Industry, at Canberra, for determining the components of variation influencing the yielding ability of wheats are analysed.

Forster, H. C. Wheat yields—breeding for yield improvement. (pp. 77–78).

The application of the method for determining characters affecting yield devised by Engledow and Wadham is traced in the production of high yielding strains for Victoria. Since variation has been noted between the phasic development of different strains, the production of a variety with a long rosette period and short jointing period, well-suited to the Australian environment, constitutes a further prospect of improving yielding ability.

Watson, J. A. Oats—disease resistance. (pp. 79–80).

The prevalence and relative importance attached to breeding for resistance to stem and crown rusts and loose and covered smuts in the different states of Australia are outlined.

Carroll, J. G. Breeding for disease resistance in oats in New South Wales. (pp. 80–81).

Smut resistance is the main objective, using resistant Victoria x Richland hybrids from the USA in crosses with local varieties. Acacia, recently developed at the New England Experiment Farm, NSW, is virtually immune from smut and is being released to farmers for trial. A stem rust resistant F_7 segregate (4168–24) of Garry x Mutica Ukraine, with resistance to *Helminthosporium Victoriae*, has been introduced from Canada to take the place of local strains possessing the Garry type of stem rust resistance which is linked with susceptibility to *H. Victoriae*.

Debrett, P. H. Breeding for disease resistance in oats and barley in Victoria. (pp. 81–82).

In the initial stages of oat breeding for resistance to loose smut and stem rust, Garry is being used as the main source of resistance in crosses with Algeribee, Dawn and Orient.

Hybridization to incorporate covered smut resistance in local malting varieties of barley has involved Kwan and the Pugsley Kwan derivatives as resistant parents.

Carroll, J. G. General objectives in oat improvement other than disease resistance. (pp. 83–85).

This general review includes breeding for ability to withstand grazing, improvement in yields of grain and hay, and resistance to lodging and shattering.

Sims, H. J. Oats—general objective of the breeding programme in Victoria. (pp. 85–88).

An outline of research during the last 20 years shows that whereas the demands were formerly for increased yields of grain and hay, breeders are now concentrating on developing varieties capable of producing green forage and of recovering after grazing.

Raw, A. R. Barley improvement. (*pp. 89–91*).

The programme of research in Australia is outlined, with particular reference to the combination of the superior quality of the Archer barleys with the adaptability and earliness of Prior types.

Symes, K. J. Barley. (*pp. 91–92*).

At the New South Wales Department of Agriculture two hybrid selections with strong straw and resistance to scald (*Rhyncosporium Secalis*) have been developed from Commander x Prior and Triple Awn x Prior; further crossing is in progress to recover the good malting quality lost in the original crosses. A new smooth-awned fodder barley has also been obtained from Abyssinian x Flynn; its yields compare favourably with Abyssinian and it matures several days earlier.

Atkinson, W. A. Rye. (*pp. 93–97*).

Objectives of rye breeding in Australia comprise: (*a*) an early maturing spring type for use in erosion control; (*b*) a late maturing spring type suitable for green fodder; and (*c*) a winter strain for grazing purposes in summer rainfall areas. Cooperation between states is advocated for the evaluation of strains already available.

Kerr, H. B. Linseed. (*pp. 98–100*).

The genetical basis of resistance to races of *Melampsora Lini* is discussed, with special reference to the three allelomorphic series, *L*, *M* and *N* (cf. *PBA*, Vol. XVII, Abst. 1700). Hybrids resistant to a large number of rust races can be obtained by crossing varieties possessing resistance factors of the different allelic series. From recent investigations at the University of Sydney it appears that all-round immunity may be achieved by the following combinations: Punjab (*N*) x Ottawa (*L*), Punjab x JWS (L_2), Punjab x Newland (*M*), Punjab x Bison and Ottawa x Tammes Pale Blue (N_4). A programme of back-crossing with Punjab as the recurrent parent crossed to Ottawa 770B, Koto and Tammes Pale Blue has reached the third back cross.

Debrett, P. H. Linseed breeding in Victoria. (*pp. 100–102*).

Although the rust resistant Walsh has satisfactory oil content and quality, hybridization is in progress to improve stooling capacity, winter growth and pasmo resistance, and to produce an early maturing strain for certain areas.

Curteis, W. M. and Johnson, R. I. Linseed improvement in New South Wales. (*pp. 103–106*).

Breeding for rust resistance is based on the use of the following resistant parents in a back-crossing programme in which Punjab and Abyssinian are the recurrent parents: Argentine C 1463, Bolley Golden C 1644, Lin Amélioré G 37/9, Bison C 1389, Concurrent G 37/28, Kenya 709–1, Moose G 3074–4, North Dakota 52, Rio G 38/5, Walsh and Zona Buenos Aires. Among hybrid selections outyielding Walsh are Punjab x Concurrent 3–2–2–0, (Punjab x Walsh) Punjab 1–3–1–0, (Punjab x Walsh)^1 Punjab$_4$ 1609, Pusa T 11 x Australian A 2–1–1, Big Moose x Redwing Y 6203 and Moose x North Dakota 2–1–6–0; all these have high oil content.

At Leeton Experiment Farm, Bison, Smoky Golden, Russian, Buda and JWS x Bison, all possessing some degree of resistance to pasmo (*Sphaerella Linorum*), have been included in the breeding programme.

Debrett, P. H. Flax breeding. (*pp. 107–108*).

The progress of breeding for disease resistance and improvements in fibre characteristics and yielding ability is reviewed, with special reference to several hybrids undergoing advanced yield tests prior to release in Victoria, South Australia, and Western Australia.

Thomas, I. The registration of cereal varieties in Australia. (*pp. 109–11*).

Registration procedure is outlined and the question of nomenclature discussed.

F.A.O. world catalogue of genetic stocks. (*pp.* 111–13).

Attention is drawn to the participation of the Commonwealth Scientific and Industrial Research Organization in the FAO scheme for cataloguing genetic stocks of wheat available for breeding purposes (cf. *PBA*, Vol. XX, Abst. 2248, Vol. XXII, Abst. 284 and Vol. XXIII, Abst. 1077).

Pugsley, A. T. Special techniques of cereal breeding and yield testing in Australia. (*pp. 114–15*).

Back-cross methods and the production of isogenic lines are briefly outlined. It is noted that at the Waite Institute, South Australia, few crosses are made and the final strain is composed of a restricted number of F$_1$ families in contrast with the Californian method of making a large number of crosses and merging numerous F$_1$ lines. Particular attention is given to a consideration of the relative efficiency of testing by rod-row and plot techniques, and to the advantages of repeating trials during a single season in a number of localities having similar soil but different climates.

Sims, H. J. The yield testing of cereals in Victoria. (pp. 115–17).

The general procedure of preliminary testing followed by junior and senior trials is reviewed, with reference to period of testing, size of plots and cultural technique.

Woodforde, A. H. and Tilt, R. J. Techniques of cereal breeding in Tasmania. (pp. 118–20).

The aims and progress of wheat, oats and barley breeding at the Cressy Research Farm are described and details are given of the methods of selection for different characteristics.

Symes, K. J. Special technique of cereal breeding and yield testing in New South Wales. (pp. 120–21).

Standard methods of designing and undertaking field trials in use throughout the state are summarized.

Thomas, I. Cereal breeding in Western Australia. (pp. 121–27).

A survey of breeding being carried out at the Merredin and Wonga Hills research stations with wheat, oats and barley is presented. Several wheat hybrids with the rust resistance of Kenya C 6041 have been undergoing advanced trials. One of these, designated Dowerin (Sword x Kenya C 6041), was recently registered; although it is outyielded by Bencubbin it will be a valuable parent for future breeding.

Copp, L. G. L. Cereal breeding in New Zealand. (pp. 128–38).

Breeding in progress with wheat, oats, rye and barley at the Crop Research Division, Lincoln, Canterbury, is described in detail. With respect to wheat, considerable attention is paid to techniques of selection and yield studies of hybrid mixtures. Methods of testing flour quality at the Wheat Research Institute, Christchurch, are summarized. Mention is made of cytogenetical investigations and studies on the inheritance of yield components and resistance to shattering.

Barber, H. N. The contribution of genetics of plant breeding [*sic*]. *(pp. 139–43).*

The fundamental problems of wheat improvement are discussed with respect to the nature of intraspecific variation, measurement of the effects of selection, factors influencing interspecific hybridization, polyploidy as a means of overcoming sterility and genomic recombination.

Watson, I. A. Variations in wheat stem rust and its relation to breeding procedures. (pp. 144–49).

Evidence for the specific relationships between certain genes carried by the pathogen and particular host genes is reviewed. The genes *F* and *G*, carried by Eureka and Yalta respectively, determine resistance to many common races of rust. It is assumed that the resistance of Eureka and Yalta over a wide geographic range is correlated with the absence of genes specific for either *F* or *G* among rust populations. In view of the possibility of the occurrence of pathogenic mutations, the need for analysing the available range of host genes controlling resistance is emphasized, so that combination of available genes may be achieved.

Wyndham, L. The identification of genes controlling reaction to pathogenic fungi in wheat. (pp. 149–58).

The nullisomic or monosomic method devised by Sears (cf. *PBA*, Vol. XV, Abst. 184) for linkage analysis in wheat polyploids is discussed, with reference to the location of specific genes for resistance to certain diseases. Results of analyses of two varieties, W 1238 and W 744, maintained at Sydney University, confirm that neither variety carries a single dominant or partially dominant gene for resistance to race 126 of stem rust. The gradation of reactions shown by the F_2 of monosomic susceptible lines crossed with normal resistant types indicates that several supplementary genes may be segregating in addition to a major factor. Further analyses are in progress.

1022 Sortsliste over korn 1952. (**Variety list of cereals, 1952**).
Tidsskr. Planteavl 1952 : **56** : 110–11.

The above list has been issued at the instance of the Danish Seed Control Commission. Two wheat, three rye, nine barley and three oat varieties, all of which except Fero barley will be known to readers of *Plant Breeding Abstracts*, are described with notes on their origin, breeder, year of release and their performance in Danish trials. For the barleys, plates are appended illustrating the kernels of each variety.

1023 GOLOVCOV, L. A.
(**Grafting cereal plants**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 80–90. [Russian].

At the Verhnjačka Research Station a method of grafting cereals giving a high percentage survival has been developed. An incision is made in the grain, which is then soaked in water for 24–30 hours. The softened endosperm is then removed through the aperture and a second dry endosperm inserted in its place. The first seed generation of the spring wheat Caesium III grafted in this way on the winter wheat Ukrainka developed a winter habit. The grafted plants and their progeny segregated in respect of ear colour. Grafting the embryos of vernalized Ukrainka on the endosperms of nonvernalized Ukrainka retarded earing. Reciprocal grafts gave uniformly early-earing material. Hard wheats were obtained by grafting an embryo of *Triticum persicum* x *T. vulgare* var. *milturum* on an endosperm of the hard wheat Arnautka Nemerčanskaja and by back-grafting one of the embryos of the resultant grains on an endosperm of Arnautka Nemerčanskaja.

Other new methods of grafting cereals at Verhnjačka involved (1) the removal from an embryo of some of the embryonic tissue between the plumule and radicle and the insertion in its place of corresponding tissue from another embryo, and (2) a technique which combined the grafting of a whole embryo on an endosperm with the above transplantation of embryonic tissue. The rye Taraščanskaja IV gave plants with lateral tillers taller than the central culms, when some embryonic tissue of the winter wheat Lutescens 17 was grafted between the plumule and radicle. The plants were of the rye type, but appeared to be cleistogamous. The first seed generation had short, broad leaves and sturdy straw like wheat, but produced large ears of the rye type. Most plants were chasmogamous. The 1000 kernel weight was 45–49 grm. Two of these plants with yellow grains were selected and their embryos grafted on the endosperm of Lutescens 17. The resultant rye plants had vitreous grains like wheat. Grafting an embryo of the wheat hybrid Hostianum 237 x Erythrospermum 15 on an endosperm of the maize variety Harjkov 23 and then transplanting embryonic tissue of the maize on to the wheat embryo caused extensive tillering and inhibited earing. At Verhnjačka embryos of wheat developed well on oat, rye, barley, rice and maize endosperms, and embryos of oats and rye formed unions with the endosperms of all the above cereals.

1024 Kiesselbach, T. A.
Do crop varieties run out?
Crops & Soils 1952 : **5** : No. 2 : 7–9.

A general discussion of the behaviour of cereal varieties over several years emphasizes that, apart from expected genetic recombination in any advanced generation of double cross hybrids and the rare occurrence of mutation, much of the alleged deterioration results from the response of a genetically uniform variety to changing weather conditions or newly evolved races of fungal or insect parasites. Varieties may also appear to change by becoming contaminated with other strains.

1025 Konzak, C. F. and Singleton, W. R.
The relationship of polyploidy to the effects of thermal neutron exposure on plants.
Genetics 1952 : **37** : 596–97. (Abst.).

Autotetraploid rye, barley and maize showed less injury resulting from exposure of dry seeds to thermal neutrons than the diploids, as indicated by measurements of seedling growth. Tetraploid oats was distinctly more resistant to such injury than the hexaploid and diploid species; the same material responded to X irradiation in the expected manner, i.e. the species with the highest chromosome number was the most resistant to injury. The results obtained from exposure of the wheat series to thermal neutrons were similar to those from the experiments with oats, but were less extreme. The uniformity of seedling injury due to thermal neutron treatment of the seeds was of particular interest, in view of the variable effects frequently obtained from exposure of the same material to X rays.

1026 Yamamoto, K.
(**Studies on the time required for earing in rice and barley varieties**).
Nogaku Kenkyusho Iho (Bull. Inst. Agric. Res.) 1949 : **1** : 181–206. [Japanese].

Japanese barley varieties are classified into 5 groups on the basis of the earing date after spring sowing. Some of these groups are characteristic of specific Japanese localities. Varietal differences were also noted in the effect of low temperature and of photoperiod on earing.

Experiments with 5 rice varieties showed that suitable photoperiodic treatment effected a relatively greater acceleration of earing in the case of the later varieties.

1027 **Improved varieties of barley and oats.**
J. Dep. Agric. S. Aust. 1952 : **56** : No. 2 : p. 59.

Breeding is in progress at Roseworthy Agricultural College, South Australia, to produce improved varieties of oats which resist shedding, and barley with strong straw to prevent losses from "necking." Particular reference is made to Ballidu, Dale and Orient oats (cf. *PBA*, Vol. XIII, Abst. 30 and Vol. XVIII, Abst. 160) and Maltworthy and Research barleys (cf. *PBA*, Vol. X, Abst. 605 and Vol. XIII, Abst. 681) which have shown some reduction in grain losses.

1028 FIEDLER, I. J.
Počet nervů v listě (anatomická variabilita) v poměru k příštímu výnosu zrní u obilovin. [**The relation between the number of veins per leaf (anatomical variability) and grain yield in cereals**].
Sborn. Česk. Akad. Zeměd. 1952 : **25** : 419–28.

Investigations of wheat, oats, rye and barley suggest that a high number of veins is normally associated with a good grain yield. However, some varieties and lines showing a high number of veins gave less productive types while others were productive despite having few veins. Breeding work to improve the productivity of the forms with the higher numbers of veins is in progress.

1029 ÅKERMAN, Å., LINDBERG, J. E. and AUGUSTIN, S.
Undersökningar av kvaliteten hos 1951 års brödsädesskörd. (**Investigations on the quality of the bread cereal crop of 1951**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 351–80.

The results of chemical analysis and tests of flour quality and baking value of spring and winter wheats and rye varieties of the 1951 harvest are recorded by the Cereal Laboratory on behalf of the National Agricultural Council for Sweden (cf. *PBA*, XXII, Abst. 1758).

1030 Het onderzoek op het gebied van het broodgraan in 1952. (**Research in the field of bread cereals in 1952**).
Tweede Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1952 : 70–84.

A list is given of the various institutions in the Netherlands engaged in research on bread cereals. The programmes of research include variety trials and breeding of rye and wheat; interspecific crossing and studies on tetraploid rye; baking quality and milling investigations; resistance to diseases and pests; research on ripening, drying and storing of the grain; and investigations on soils.

1031 POPOFF, A.
Die Auswuchsneigung beim Getreide im Zusammenhang mit dem Protein des Korns. (**The relation between the tendency to germinate and the protein content of the grain in cereals**).
Angew. Bot. 1943 : **25** : 150–65.

Data are given on the germination rate and protein content of a series of Bulgarian and other varieties of wheat, oats, rye and barley. In general, there was a significant inverse correlation between these two characters.

1032 VALLE, O.
Kevään 1951 lajikekysymys koetulosten valossa. (**Varieties in the spring of 1951, in the light of experimental results**).
Koetoiminta Käytäntö 1951 : **8** : No. 4 : 1, 4.

The performance of cereal introductions in different parts of Finland is discussed, with particular reference to Kärn [Kernel] wheat, Sisu, Sol II [Sun II] and Marne oats and Balder barley. Hohenheim fodder pea and a locally developed green pea, Paula (cf. *PBA*, Vol. XVIII, Abst. 21), are among other varieties which proved outstanding.

1033 Reuniéronse los fitotécnicos y los criadores de cereales. (**Meeting of plant breeders and cereal originators**).
Idia 1952 : No. 54 : 46–47.

A meeting of cereal breeders and phytopathologists took place on 29 April 1952 at the Castelar Plant Breeding Institute in Argentina, to discuss closer collaboration between the two groups in the production of disease resistant varieties. Among other things it was pointed out that many oat varieties introduced into Argentina from abroad are susceptible to bacterial attack and attention should be given to this in breeding from them.

1034 JAMALAINEN, E. A.
Viljan peittauskokeet maatalouskoelaitoksen kasvitautiosastolla vuosina 1943–1946. (**Experiments on the protection of cereals at the Plant Diseases Department of the Agricultural Experimental Station during the years 1943-46**).
Valt. Maatalousk. Tiedon. 1947 : No. 213 : Pp. 13.

In the course of experiments on the protection of cereals from disease by means of chemical fungicides, data are incidentally supplied for the results of the various treatments with named varieties of oats in relation to *Ustilago Avenae* and of wheat with *Tilletia caries.* Comparative data are also given on the effect of the various seed dressings on the germination of a number of varieties of wheat and rye.

1035 Vallega, J. and Favret, E. A.
Las royas de los cereales en Argentina. (1 Parte). [**The cereal rusts in Argentina** (**Part 1**)].
Idia 1952 : No. 54 : 17–39.

A rather full account is given of the rust species attacking the main cereals in Argentina, and of investigations carried out on the physiological races and subraces comprising them, their prevalence in different years in Argentina and adjacent countries, the relationships between the biotypes and the varieties grown, and their significance for breeding work.

1036 **Report of cooperative uniform cereal rust observation nurseries for the year 1951.**
US Dep. Agric. Bur. Pl. Indust. Soils, Agric. Engin. Div. Cereal Crops Dis. Beltsville, Md. 1952 : No. 33 : Pp. 22. (Mimeographed).

A summary is presented of the results of uniform tests on the reactions of wheat, oat and barley varieties and selections to rusts in the United States and in Manitoba. Information is also given on the distribution of physiological races of the pathogens.

Wheat rust nurseries

Levine, M. N. and Stakman, E. C.
Puccinia graminis tritici.

Among the spring wheats tested, the *Triticum durum* selection CI 12924 [Golden Ball x (Iumillo x Mindum)] was the most resistant to stem rust, showing no infection in 21 out of 29 nurseries in which it was tested, and a bare trace in the remaining 8. Four hard red hybrids were also very highly resistant: two selections from the cross (Ill.1–Chinese)^2 x *T. Timopheevi*; CI 12916 (Mida x Kenya 117–A); and CI 12917 (Kenya 58 x Newthatch).

Of the winter wheats, two Minturki x *T. Timopheevi* selections were outstanding for their uniformly high degree of resistance.

Johnston, C. O. Puccinia rubigo-vera tritici.

As in previous years, *T. Timopheevi* showed the lowest average infection in the spring wheat class. As a group, the *T. durum* selections were more resistant than the common wheats; the most resistant was CI 12924 [Golden Ball x (Iumillo-Mindum)]. Of the common wheats the following had least infection: Frontana; two lines from (Ill.1–Chinese)^2 x *T. Timopheevi*; Exchange; Rio Negro; Lee; Chapingo; and selections from Lee x 3175, Thatcher x Surpresa, Frontana x (2265 x Redman)^2 and Henry x Cadet.

Among the soft red winter selections CI 12658 (Frondoso x Trumbull-Hope-Hussar) was the most resistant. Many of the soft red winter wheats were highly resistant at all but a few stations, indicating the occurrence of physiological races to which they were susceptible. No hard red winter selection was as resistant as CI 12658; 7 out of the 16 selections however had average infections below 10%. Quanah was the most resistant, with 3% infection.

Oat rust nurseries

Levine, M. N. and Stakman, E. C.
Puccinia graminis avenae.

Oat varieties and selections with a stem rust infection coefficient of less than 6% in nurseries with 14·8% average infection comprised Rainbow, Canuck and four CI selections.

Murphy, H. C. and Simons, M. D.
Puccinia coronata avenae.

Among the tester varieties, Landhafer, Santa Fe, Trispernia, Victoria and Ukraine were the most resistant with infection ratings of 1·0, 2·4, 3·1, 3·8 and 7·3% respectively. With the exception of Landhafer, these varieties exhibited a higher relative susceptibility in the southern regions than in the north central and northeastern regions. Of the new varieties and selections, Santa Fe and Santa Fe x Clinton^3 were highly resistant. Cedar (Victoria x Hajira-Banner) x (Fulghum x Victoria), CI 5370 (D69-Bond) x Fultex and Mustang were moderately resistant.

Barley rust nurseries

Levine, M. N. and Stakman, E. C.
Puccinia graminis.

The barleys Plains, Kindred, CI 4239, CI 7123, Hietpas and Vantage had infection coefficients for stem rust below 5%.

Levine, M. N. and Stakman, E. C.
Puccinia hordei.

Estate, CI 7123, Chilean D, Quinn, Hietpas and a Bolivia x Chevron hybrid were highly resistant.

1037 Pon, D. S.
A new light-colored race of *Helminthosporium sativum.*
Phytopathology 1952 : **42** : p. 472. (Abst.).

A race of *H. sativum* isolated from the barley Kindred and producing light-coloured spores exhibits a much greater virulence than the common dark-spored races. It attacks not only barley varieties generally considered to be resistant but also oats, maize and many standard varieties of spring wheat.

WHEAT

1038 Oliva, A.
Successi e prospettive della granicoltura montana. (**Achievements and prospects of alpine wheat cultivation**).
Humus 1952 : **8** : No. 9 : 10–13.

The view is expressed that the particular conditions of alpine areas favour the production of mutations and by selection from mountain populations it has indeed been possible to produce a number of promising wheats possessed of such favourable characters as resistance to cold and rust, such as Est 72 and its derivatives. One of these, 62/4 (Est x Mc 245), is practically immune to rust and exceptionally frost resistant and is recommended for alpine conditions of high fertility. Other varieties are recommended for other types of ground.

1039 Forlani, R.
I migliori frumenti. (**The best wheats**).
Humus 1952 : **8** : No. 9 : 6–9.

Among the wheats that have given the best results in 1952 special mention is made of Mara, which has given peak yields in both the plains and the lower highlands of northern Italy. Other varieties are recommended for less favourable conditions of climate or of farming.

1040 Navolockiĭ, A.
(**The spring wheat Tulun 70**).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : p. 55. [Russian].

Tulun 70, which was made a standard in the province of Leningrad in 1940, is described. Reference is also made to other standards developed in recent years at the Leningrad Breeding Station, namely, Severjanka [Northerner] and Pamjatj Urala [Ural Memorial], which are also productive, adapted to northern climatic conditions, and show resistance to lodging and shedding.

1041 Chavan, V. M., Chaudhari, B. B. and Patil, J. A.
Genetic improvement of irrigated wheats in Bombay. Baxi-288-18 and Mondhya-3-2.
Poona Agric. Coll. Mag. 1952 : **43** : 3–6.

Selection of the mixed local wheats Baxi and Mondhya at Niphad has resulted in the improved strains Baxi 288–18 and Mondhya 3–2, respectively. Baxi 288–18 is classified as *Triticum durum* var. *melanopus*, and Mondhya 3–2 as *T. vulgare* var. *graecum*. Since they are susceptible to stem rust, these two strains and also promising sister selections have been crossed with introduced resistant types; highly resistant F_7 selections are now undergoing final agronomic tests. Rust susceptible but otherwise promising selections of Wagia and Chandushi have also been crossed with resistant introductions.
A chart is appended showing the course of selection and hybridization of local wheats at Niphad.

1042 Satya Prakash Kohli and Patkar, M. B.
Improved varieties of hill wheats.
Indian Fmg 1952 : **2** : No. 6 : 26–27.

The Australian variety Ridley (cf. *PBA*, Vol. XX, Abst. 2183) and the early, bearded wheat NP 770 have shown superiority in yield and other characters over the older varieties and unselected mixtures grown at the higher altitudes in Himachal. Np 770, developed at the Wheat Breeding Substation, Simla, from a cross of an Indian variety with a Japanese type, has the outstanding advantage of resistance to yellow rust and loose smut.

1043 Porter, K. B., Atkins, I. M. and Whitfield, C. J.
Wheat production in the Panhandle of Texas.
Bull. Tex. Agric. Exp. Sta. 1952 : No. 750 : Pp. 38.

The bulletin includes information on breeding, commercial wheats and experimental varieties in the Panhandle region of northwest Texas.

1044 Woodforde, A. H. and Tilt, J.
Macquarie—a new Tasmanian wheat variety.
Tasm. J. Agric. 1950 : **21** : 243–45.

Detailed information is given on the biscuit wheat Macquarie (cf. *PBA*, Vol. XXII, Abst. 240).

1045 Badanin, P. A.
(**Growing heterogeneous spring wheat plants for intravarietal hybridization**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 75–76. [Russian].

Intravarietal hybrids of a local hard wheat var. *melanopus* were earlier and grew more vigorously in Kuĭbyšev than the initial material and produced longer ears and more tillers per plant and more grains per ear. Differences between the parents of the intravarietal crosses were induced by different fertilizer applications and seed treatments.

1046 Truhinova, A. T.
(Hybridization between rye and wheat).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1952: No. 10: 3–6. [Russian].

At the Institute of Genetics of the USSR Academy of Sciences direct crosses between rye and wheat gave hybrids of the rye type with 14 chromosomes. The reciprocal crosses produced hybrids either combining the characters of both parents or hybrids of the female parent type. The F_1 of Ukrainka x rye resembled Ukrainka, while that of Lutescens 329 x rye had the characters of Lutescens 329.

1047 Artaza, C. A.
La resistencia a "*Puccinia graminis tritici*" en cruzamientos de "*Triticum* x *Agropyron*." **(Resistance to *P. graminis tritici* in crosses of *Triticum* x *Agropyron*).**
Rev. Argent. Agron. 1952 : **19** : 179–83.

Various hybrids obtained from the USA were infected artificially with races 15 and 17 of *P. graminis* var. *Tritici*, which are the most common biotypes in Argentina, and with race Arg. 1 of *Erysiphe graminis*. The results presented show that resistance to rust and susceptibility to mildew were predominant in the material. Segregation occurred for all three resistances and all combinations occurred, but a marked deficiency of the combination resistance to race 15 and race 17 suggested the existence of linkage between these two characters.

1048 Sasaki, M.
(The efficacy of colchicine treatment in inducing chromosome reduplication in the F_1 of *Triticum vulgare* x *Secale cereale*).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 197. [Japanese]. (Abst.).

Amphidiploids have been induced in F_1 material involving hybrids between 60 wheat varieties on the one hand and 7 rye varieties on the other. Colchicine was applied at a concentration of 0·05%. Survival and number of amphidiploids produced increased markedly when the experiments were performed at a low temperature (7° C).

1049 Minčakov, K. V.
(Changing the inheritance of plants).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : p. 73. [Russian].

At the Bureĭskiĭ Varietal Field, Lutescens 329 winter wheat produced 22 hard wheat ears when sown in December. The seed from those ears was sown in the following year in April and gave hard wheats of the *hordeiforme* and *melanopus* types and some plants resembling var. *erynaceum*.

1050 Sadykov, A. M.
(New instances of wheat conversions).
Agrobiologija (Agrobiology) 1952 : No. 5 : 42–44. [Russian].

Conversions of hard wheat to soft wheat and soft wheat to rye in Azerbaĭdžan are reported. Pure seed of the hard wheats Šark [Orient], from Apulicum 82/1 x Horanka, and Kara-Kylčih [Black-awned] and the soft wheat Alty-Agač [Sylvan], a population comprising vars. *ferrugineum* and *erythrospermum* was utilized. The material was sown in the autumn on 5 different dates with 10 day intervals between each date. The soft wheats which evolved from the hard wheats included a *pseudo-Barbarossa* type with 42 chromosomes. Ears of Alty-Agač were discovered with single rye grains. The grain of the rye type had 14 chromosomes.

1051 Simlote, K. M.
Development of *durum* wheats in Malwa.
Indian J. Agric. Sci. 1951 : **21** : 11–32.

Ear and tiller development were studied in five ecological types of *Triticum durum*. The two local Central Indian types were superior to the three varieties from other parts of India with respect to total grain yield, 100 grain weight and growth rates of tillers and ears, but inferior in grain number per ear. Locally adapted material, whose yield attributes are already at a higher level compared with introduced varieties, should therefore be used in selecting higher yielding wheats for Malwa.

1052 Sears, E. R.
Homoeologous chromosomes in *Triticum aestivum*.
Genetics 1952 : **37** : p. 624. (Abst.).

The genetic homologies of 20 of the 21 chromosomes of common wheat have been investigated, chiefly by testing the ability of tetrasomes to compensate for nullisomes. The 20 chromosomes studied fall into the following six groups of three and one group of two: I, XIV, XVII; II, XIII, XX; III, XII, XVI; IV, XV; V, IX, XVIII; VI, X, XIX; and VII, XI, XXI. Tests are being carried out to determine whether chromosome VIII belongs to the group consisting of IV and XV. From these results it can be inferred that each homologous group consists of one chromosome from each of the genomes A, B and D (or C), the three chromosomes of each group having been derived from the same ancestral chromosome. This inference is supported by the fact that each series contains a single chromosome from the D genome (XV to XXI). The possibility, however, that additional homologies exist has not yet been excluded, for only 32 of the 420 possible nullisomic-tetrasomic combinations have so far been studied. Furthermore, since the compensation observed in any particular combination probably involves only a few genes, the chromosomes concerned may actually have only a small fraction of their genetic material in common.

1053 Matsumura, S.

Chromosome analysis of the Dinkel genome in the offspring of a pentaploid wheat hybrid. I. Nullisomics deficient for a pair of D-chromosomes.

Cytologia, Tokyo 1952 : **16** : 265–87.

Descriptions are given of dwarf hybrids ($2n = 40$) between the Emmer wheat *Triticum polonicum* var. *vestitum* (AABB) and the Dinkel wheat *T. Spelta* var. *Duhamelianum* (AABBDD) which carry two pairs of homologous genomes (AABB) and only six chromosome pairs of a single D genome. Four of the seven possible nullisomics lacking chromosome pairs designated d, e, f and g have been previously described (cf. *PBA*, Vol. I, Abst. 168). Dwarfs lacking chromosomes a, b and c occur relatively infrequently and are described for the first time, the absence of each chromosome pair being accompanied by well-defined morphological characteristics. None approached the vigorous tillering capacity, tall culms and high degree of fertility characteristic of f dwarfs. The absence of the f pair has little effect on the compatibility of the three genomes, suggesting that either genome A or B contains a chromosome pair closely homologous with f, so that the presence of the latter is not fundamentally important. A fragment from A or B showing homology with f has been found.

Hybridization between each nullisomic and *T. Spelta* produced individuals of almost normal height, showing slight differences in fertility and height according to the specific qualities of missing chromosomes. These plants had 41 chromosomes ($20_{II} + 1_I$) and are assumed to have arisen by union of gametes with 20 and 21 chromosomes. The univalent, belonging to the A or B genome, is probably homologous with the missing chromosome of the dwarf.

1054 Matsumura, S.

Chromosome analysis of the Dinkel genome in the offspring of a pentaploid wheat hybrid. II. Which of the three *vulgare* genomes of the β-speltoid is incomplete?

Cytologia, Tokyo 1952 : **16** : 307–14.

The mode of chromosome conjugation is described in the offspring of β-speltoid mutants of *Triticum vulgare* (cf. *PBA*, Vol. XX, Abst. 1527) crossed with the Emmer wheat *T. turgidum* var. *nigrobarbatum*, the Einkorn wheat *T. aegilopoides* var. *boeoticum* and nullisomics deficient for the f and g pairs of D-chromosomes (cf. Abst. 1053). Data support the view, expressed independently by Uchikawa, Sears, and Smith, Huskins and Sander (cf. *PBA*, Vols. XXI, Abst. 222, XV, Abst. 184 and XXI, Abst. 1527, respectively), that genome B of the β-speltoid is incomplete. It is pointed out that the missing chromosome is generally designated chromosome C.

1055 Matsumura, S.

Chromosome analysis of the Dinkel genome in the offspring of a pentaploid wheat hybrid. III. 29-chromosome D-haplosomics and their relations to nullisomics.

Cytologia, Tokyo, 1952 : **17** : 35–49.

Detailed genome analyses have been continued (cf. Abst. 1053) with 29-chromosome individuals from the F_2 of Emmer x Dinkel crosses and from back crosses to the Emmer parent. These hybrids ($14_{II} + 1_I$) possess two complete Emmer genomes (AABB) and a single chromosome of the seven pairs comprising the Dinkel genome (D); they are therefore designated D-haplosomics. The subsequent generation of D-haplosomics contained plants with 28, 29 and 30 chromosomes. Comparisons between the haplosomics and the corresponding 28-chromosome individuals have indicated the specific effects of single Dinkel chromosomes on the phenotype, and have provided evidence that three of the D-haplosomics have excess chromosomes corresponding to the b, c and e chromosomes of the Dinkel genome. The b chromosome bears the genes for lax ear and short outer glume; the gene for tillering capacity is located on the c chromosome and that for hollow stem on the e chromosome.

1056 NAKAJIMA, G.
Cytological studies on intergeneric F_1 hybrid between *Triticum* and *Secale*, with special reference to the number of bivalents in meiosis of PMC-s.
Cytologia, Tokyo 1952 : **17** : 144–55.

Detailed observations are reported on meiotic configurations in pollen mother cells of F_1 hybrids of *T. durum* x *S. cereale*, *T. Spelta* x *S. cereale* and *T. vulgare* x *S. cereale*. A high frequency of univalents, with a maximum of 4 bivalents, was observed in the hybrids with 21 and 28 somatic chromosomes, from crosses involving *T. durum* and *T. Spelta* respectively. Several *T. vulgare* hybrids ($2n = 28$) had more than 4 bivalents, one having as many as 11. It is evident that 7 of these 11 bivalents are due to autosyndesis among the A and B genomes of *Triticum;* probably three bivalents are derived from the R genome of *Secale* (cf. *PBA*, Vol. XII, Abst. 1065), and the remaining bivalent originates from the D genome of *Triticum*. No affinity was observed between the A, B and D genomes of *Triticum* and the R genome of *Secale*.

1057 ARNASON, T. J., PERSON, C. O. and NAYLOR, J. M.
Radiation-induced mutations in wheat and barley.
Canad. J. Bot. 1952 : **30** : 743–54.

The cytogenetical effects of P^{32} upon *Triticum vulgare*, *T. durum*, *T. monococcum* and *Hordeum vulgare* were analysed. Most of the observed chromosomal aberrations in the treated (R_1) generations were directly related to breakage and subsequent rearrangement. The greatest variety of aberrations occurred in *T. vulgare*, both in the R_1 and R_2. Phenotypic changes in barley and *T. monococcum* consisted of dwarf and chlorophyll mutants. Study of mutants was concentrated upon *T. vulgare*, in which 15 mutants were obtained, chiefly among progenies of plants treated with the higher doses of P^{32}. Most of the mutants were morphological; no albinos arose. Nearly all the mutants so far investigated in detail have been characterized by some gross chromosomal change; five are monosomics. Speltoid and compactoid types have occurred several times. Two mutants of wheat were also induced by irradiating dry seeds with high-energy X rays; both had undergone chromosome breakage and rearrangement.

1058 ŽEBRAK, A. R.
(Hybrids involving three species of wheat).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **79** : 321–24.

Wheat hybrids combining the chromosome complements of *Triticum turgidum*, *T. Timopheevi* and *T. vulgare* are described. The hybrids were obtained at the White Russian Academy of Sciences from artificial crosses of the amphidiploid *T. turgidum* x *T. Timopheevi* with the soft wheat varieties *lutescens* and *albidum*. They had taller straw and more compact ears than their parents, but showed a very low degree of fertility. It is hoped that highly fertile tridiploids with 98 chromosomes will be obtained.

1059 ŽEBRAK, A. R.
(The trihaploid wheat-rye hybrids).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **78** : 773–76. [Russian].

An amphidiploid of wheat, obtained at the White Russian Academy of Sciences from *Triticum turgidum* x *T. Timopheevi*, crossed readily with the rye Vjatka Moskovskaja [Moscow Vjatka]. The seed had a low degree of viability and was empty and small. However, 17 trihaploids, with 34–35 chromosomes, were grown from the seed, some indoors and others in the field. The hybrids were promising in respect of several economic characters, including good tillering capacity, compact ear and many spikelets per ear, but they proved sterile. It is hoped to restore their fertility by the orthodox methods. The effects of external conditions upon the hybrids are described. They caused great variability of morphological characters, including the development of abnormal plants such as an individual with one pubescent and three glabrous culms, plants producing ear-bearing stems from the second node and a hybrid with hairless nodes and empty glumes.

1060 REFAI, F. Y. and MILLER, B. S.
The determination of pantothenic acid in wheat.
Cereal Chem. 1952 : **29** : 469–75.

Significant interspecific and intraspecific differences in calcium pantothenate content were found, using the usual microbiological technique and a modified method of extraction by methanol instead of water.

1061 VARUNCJAN, Ė. S.
(Crop rotations for northern Muganj).
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. 5 : 65–73. [Russian].

New varieties of wheat, Dika and Enilik, which are superior to the standard Šark [Orient], have been recently developed in Georgia. Šark, bred at Mir-Bašir, has a short vernalization phase and reaches maturity when sown in rotation after cotton in March. The long-stapled cottons have been superseded by early medium-stapled varieties.

1062 K-LA, A.
Miksi syysvehnä ei ole kevätvehnä? **(What distinguishes autumn wheat from spring wheat ?)**
Koetoiminta Käytäntö 1951 : **8** : No. 4 : p. 3.

The genetical factors determining differentiation between spring and winter wheats are discussed. Hybridization between spring wheats, which do not require vernalization, and winter wheats of superior quality and high yielding ability, has resulted in offspring which give high yields when sown in spring.

1063 OLJŠANSKIĬ, M. A.
(The theoretical principles of the method of intervarietal open hybridization in plants).
Agrobiologija (Agrobiology) 1952 : No. 5 : 9–22. [Russian].

Breeding work at Odessa is based on Mičurinite genetics, and utilizes selective fertilization and the principle of transmission of vigour to progenies from heterogeneous material (cf. Abst. 847). Reference is made to productive, vigorous winter wheats of the maternal type obtained by intervarietal open pollination of Ukrainka, Odessa 3 and Odessa 12.

A brief account of breeding work with cotton is given. Several new varieties, including Odessa 4, producing large bolls and long staple have been obtained by hybridization and selection of early types in the F_1 and later generations. Odessa 6, which is the most recently developed variety, is an intervarietal hybrid between Odessa 3, 4 and 5.

1064 BONDARENKO, G. K.
(The effects of vernalization and external conditions upon the fertility of *Triticum vulgare* x *T. durum* hybrids).
Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR) 1951 : **79** : 157–59.

At the Ukrainian Institute of Grain Farming, compatibility between soft winter wheats and hard spring wheats and the fertility of the F_1, F_2 and F_3 were improved when the seed of *T. vulgare* was vernalized and sown in the spring before making the crosses. F_1 plants obtained by this method from Ukrainka 246 [Ukrainian 246] x Narodnaja [People's] and Melanopus 37 x Ukrainka 246 were fertile and 83·3–85·7% of them produced over 10 grains each. The percentages of fertile hybrids in the former cross were 86·3% in the F_2 and 89·7% in the F_3 and in the latter cross 75·6% and 84·2%, respectively. The treated hybrids produced progenies with more grains per plant than those of the same origin but without treatment.

1065 KORIĆ, M. and KORIĆ, S.
Nove teratološke forme pšenice dobivene križanjem. **(New teratological forms of wheat obtained by hybridization).**
Annu. Inst. Biol. Sarajevu 1950 : **3** : 55–78.

Many varieties of wheats of diverse origin have been bred continuously for a large number of spikelets at Križevci and Osijek, Slovenia. After many years, in 1946, the material produced teratological forms with appreciably more spikelets per ear than normal wheats.

The abnormal wheat has been designated *Triticum vulgare* var. *floribunda*, and the principal types comprising it *duplicata*, *ramifera* and *deformata*, respectively. Most of the new forms were of the *duplicata* type with 2–3 spikelets borne on each node. The *ramifera* forms had florets changed into spikelets and spikelets into ears. All ears developed supplementary spikelets of the *duplicata* type. The *deformata* forms were the least numerous. They were characterized by an abnormal development of paleae and other minor malformations.

The method of origin of the teratological forms is unknown and the alternative theories put forward are transgressive segregation, mutation and transgenation.

The teratological material showed a capacity for survival similar to that of normal wheats and remained constant, but it has not given any productive wheats of immediate practical value. Breeding wheats for productive ears involving the *duplicata* and *ramifera* types is being continued.

1066 LARSON, R. I.
Aneuploid analysis of inheritance of solid stem in common wheat.
Genetics 1952 : **37** : 597–98. (Abst.).

The hollow-stemmed wheat Chinese Spring and solid-stemmed variety S-615 differ as regards four major genes affecting stem solidity. According to the results of an analysis of aneuploids, a gene for stem solidity is located on chromosome VIII, and chromosomes XIII, XIX and XX of Chinese Spring each carry a gene inhibiting solidity. In both parents, chromosome II is weakly and XXI strongly inhibitory of pith development. Apparently I, IX, X, XI and XII must be present in the disomic condition for the full expression of stem solidity. On the basis of their effects on stem solidity, chromosomes I, VIII, IX, X, XI, XII and XIII are regarded as constituting genome B, and II, III, IV, V, VI, VII and XIV (not tested) genome A. The following positions are suggested for some of the genes for stem solidity postulated by Yamashita (cf. *PBA*, Vol. VIII, Abst. 457): m_A, chromosome II; m_B, chromosome XIII; and O_D, chromosome XX. Hollow-stemmed varieties of common wheat probably carry genes on chromosomes XIII, XIX and XX inhibiting pith production; S–615 is without these factors.

1067 Ryžeĭ, I. P.
(Changing the inheritance of the spikelets of winter wheat).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **78** : 777–78. [Russian].

A method of stimulating the development of productive ears in wheats, including Erythrospermum 72, Pseudo-Hostianum 51 and Hordeiforme 44, has been investigated. Portions of the ears were removed to intensify the flow of nutrients to the remaining spikelets. All the above varieties showed a good response to the treatment in the first year and produced longer spikelets which have borne more grains than the controls. The development of productive spikelets can be intensified and fixed by repeating the treatment for several successive generations.

1068 Karišnev, R. V.
(Multiple hybrids of spring wheats).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 11–18. [Russian].

At the White Russian State Breeding Station, crosses were made between various spring wheats, involving Novinka [Novelty] from Preston x Prelude as the pollen bearing parent. The F_1 and later generations of *Triticum sphaerococcum* x Novinka, *T. compactum* x Novinka and Caesium 111 x Novinka were studied at the above and several other research stations. They showed very extensive segregation. This was attributed to the effect of the male parents. On the other hand, *T. compactum* transmitted to its progenies the characters of long ear, *T. sphaerococcum*, compact ear and winter habit, and Caesium 111, good tillering capacity.

Some promising material, including productive, hardy and early winter forms from *T. sphaerococcum* x Novinka, has been selected.

More recently, promising multiple hybrids have been produced at the Kalinin State Breeding Station. Various spring wheats, including Diamant [Diamond] and Aleksandrovskaja 2863, were crossed with Moskovka, a productive hybrid from Tulun 70 x Kitchener. The F_1 and F_2 of Diamant x Moskovka showed extensive segregation. The F_1 and F_2 produced some forms combining the characters of their parents and others differing from both in respect of their ears. The F_2 gave mostly plants of the maternal type when trained upon rich soil. The remaining segregates consisted of paternal, intermediate and new forms. Many hybrids selected for their productiveness resembled either Diamant or Moskovka.

1069 Vinogradova, E. I.
(Accelerating heritable changes in plants by sowing immature seed).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **79** : 663–64. [Russian].

At the Leningrad State Breeding Station the conservatism of inheritance of several wheats was broken down by sowing immature seed vernalized for 35 days and then kept for 13 days at − 3° and − 4° C. Heritable changes in DS–2444/2 included the development of several new forms of the *lutescens*, *milturum* and *subferrugineum* types.

1070 Kawakami, J. and Hatamura, M.
(On the mechanism determining frequency of 2*n*-2*n* twins in common wheat).
Ikushugaku Zasshi/Japan J. Breeding 1952 : **1** : 189–91. [Japanese].

Three marker genes were used to determine the frequency in the F_2 of dominant and recessive segregates in 2*n*–2*n* twin seedlings. The observed distribution of F_2 individuals was in accordance with the assumption that the two synergids may act as eggs and that the first pollen tube to penetrate the embryo sac is liable to fertilize two of the female gametes, should these be available.

1071 De Miranda, H. and Jongh, G.
De bakwaarde van ongebuild meel, gemalen van in Nederland verbouwde tarwerassen. (**The baking value of whole meal milled from wheat varieties grown in the Netherlands**).
Tweede Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1952 : 45–55.

Protein content, gluten quality and the proteolytic activity of the flour were determined. Protein content proved an inadequate criterion of baking quality, especially for Alba and Cappelle. The values obtained by the alveolograph of Chopin and by the Pelshenke test were better correlated with the results of the baking test. The mean baking quality for each district showed a good correlation with the protein content. The effect of gluten quality is less important in comparing districts than in comparing varieties.

1072 Harris, R. H., Sibbitt, L. D. and Scott, G. M.
Effect of variety on the milling and baking quality of bread and durum wheat flour blends.
Cereal Chem. 1952 : **29** : 421–30.

Data are given on the milling behaviour of the hard red spring wheats Rival, Mida and Cadet, the soft white wheat Golden, and the durum varieties Kubanka, Carleton, Stewart, Mindum, 308 and Nugget, and on the baking properties of unblended and blended flours of these varieties.

1073 Wolf, M. J., Seckinger, H. L., Rosewall, E. C., MacMasters, M. M. and Rist, C. E.
Studies of water-insoluble hemicelluloses of the endosperm cell walls in relation to milling quality of seven Pacific Northwest wheat varieties.
Cereal Chem. 1952 : **29** : 399–406.

Observations on the degradation of the cell walls of the starchy endosperm in kernel sections treated with acid or alkali provided a general rather than a specific indication of varietal milling quality. Milling quality showed no correlation with the composition of the hydrolysed hemicelluloses of the endosperm cell walls.

1074 Larkin, R. A., MacMasters, M. M. and Rist, C. E.
Relation of endosperm cell wall thickness to the milling quality of seven Pacific Northwest wheats.
Cereal Chem. 1952 : **29** : 407–13.

A good correlation was found between milling quality and thickness of the endosperm cell walls in the region 20–200 μ from the aleurone. The possible use of this correlation in the early prediction of milling behaviour of new selections in breeding is suggested. Varietal differences in thickness of aleurone cell walls were not correlated with differences in milling quality.

1075 Broekhuizen, S.
Verslag van een onderzoek naar de bakwaarde van het zomertarweras Koga. (**Report on an investigation on the baking quality of the spring wheat variety Koga**).
Stichting Coörd. Cult. Onderz. Broodgraan, Wageningen 1952 : Pp. 24. (Mimeographed).

Koga, from the cross Heine's Kolben x Garnet, is early ripening, tolerates late sowing, has short straw, does not lodge easily and in 1951 outyielded the other spring wheats in the Netherlands. Extensive tests have, however, shown that as a rule the baking quality is defective owing to its short, stiff and not very extensible gluten. Gluten of this type should be avoided in breeding to improve baking quality.

1076 Elliott, F. C., Darroch, J. G. and Wang, H. L.
Uniformity trials with spring wheat.
Agron. J. 1952 : **44** : 524–28.

On the basis of data from trials conducted in 1949 and 1950, estimates of the number of replications for different plot sizes and the area required per variety to obtain equal sensitivity from various plots have been made for the irregularly undulating topography of the Palouse region of eastern Washington. A substantial reduction in number of replications necessary to achieve the required degree of sensitivity may be effected by use of incomplete block designs.

1077 **World catalogue of genetic stocks. Wheat. Supplement No. 2.**
FAO, Rome, Italy 1952 : Pp. 41.

A further supplement (cf. *PBA*, Vol. XXII, Abst. 284) gives details of genetic stocks which have become available for breeding purposes since the catalogue was first published (cf. *PBA*, Vol. XX, Abst. 2248).

1078 Bottazzi, G. B.
Antichi ceppi. (**Old stocks**).
G. Agric. Domen 1952 : **62** : p. 275.

The writer urges the value of the local races and populations of indigenous Italian wheats in breeding new varieties, specially for the hot, arid districts of the central parts of southern Italy and for the islands, where resistance to drought and rust is so important.

1079 MARINIČ, P. E.
(Varieties of spring wheat for farming under irrigation).
Sovetskaja Agronomija (Soviet Agronomy) 1952 : No. 5 : 8–13. [Russian].

Several productive wheats, adapted to cultivation under irrigation in various arid regions of the USSR, are listed. Most of them show resistance to drought, lodging, shedding and diseases, produce large grain with good baking and milling properties and are suitable for combine harvesting. The list includes several land varieties from Uzbekistan, Tadžikistan, Kirgizia, Kazahstan and Armenia, as well as Lutescens 55/11, Hordeiforme 432, Lutescens 758, Albidum 43 and Erythrospermum from Saratov, Melanopus 69 and Hordeiforme from Krasnyĭ Kut, Bezenčuk 98 from Bezenčuk, Donskaja Garnovka 672 [Don Garnovka 672] from Rostov, Narodnaja [People's] from Harjkov and Čakinskaja 226 from the Čakinskaja Breeding Station.

1080 BALDONI, R.
Prova quadriennale su varietà di frumento. (**Quadrennial trial of varieties of wheat**).
Ann. Sper. Agr. 1952 : **6** : 1235–65.

From 1948 to 1951 trials of numerous recently developed Italian wheats were carried out at Corticella, near Bologna, using the randomized block and lattice square methods. Tables are given showing yields, earliness, proportion of grain to straw, and resistance to lodging, diseases and cold.

A comparison of varieties bred within the last ten years and those produced in the previous thirty suggests that any marked advances in future wheat breeding must be based on the introduction of new genetic material.

1081 PETROV, P.
(A new wheat variety Omsk 2078).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : p. 54. [Russian].

Omsk 2078 (Milturum 290/22821 x Udarnica [Shock Worker]) was bred at the Siberian Institute of Grain Farming. It is 10 days earlier and yields 1·6 c. per ha. more than the spring wheat Milturum 321 and shows resistance to lodging, shedding and loose smut. It has been made a standard for the woody steppe of the province of Omsk.

1082 PEREKALJSKIĬ, F. M.
(Hard wheat in the Non-black-earth Zone).
Sovetskaja Agronomija (Soviet Agronomy) 1952 : No. 5 : 14–19. [Russian].

Hordeiforme 10, Narodnaja [People's], Melanopus 69 and Hordeiforme 5866 did well in trials conducted in several provinces in the Non-black-earth Zone. At the Gorjkiĭ Research Station a new variety, adapted to cultivation in Gorjkiĭ and in the Tartar and Udmurtj republics was selected from local hard wheats. Hordeiforme 496 carries resistance to lodging, shedding, loose smut and rust and produces red awned ears with white grain of good quality. It has a growth period of 90–95 days and outyields Lutescens 62 by 3-4 c. per ha.

1083 STERTEN, A. K.
Høstsædsdyrking i fjellbygdene i lys av nyere overvintringsstudier. Forsøksresultater fra Statens forsøksgård Løken 1918–40. (**Autumn cereal cultivation in the mountain districts, in the light of recent studies of over-wintering. Experimental results from the National Experimental Station, Løken, 1918-40**).
Tidsskr. Norske Landbr. 1952 : **59** : 269–303.

Extensive observations have led the writer to conclude that in order to obtain winter wheats, hardy and reliable enough for the mountainous parts of Norway, varieties must be bred and selected on the spot for resistance to *Typhula borealis* and *Sclerotinia borealis*, which occur in the higher lying parts of the country (cf. *PBA*, Vol. XVIII, Absts. 198 and 1506).

1084 SMELTZER, D. G.
Inheritance of resistance to race T-1 of *Tilletia caries* in Minturki and Cooperatorka wheats.
Agron. J. 1952 : **44** : 529–33.

At Davis, Calif., Minturki (Odessa x Turkey) and Kooperatorka, of Crimean origin, were crossed with the susceptible Baart and with resistant Martin, Turkey 3055, Rio and Selection 1403, which are testers for the *M*, *T*, *R* and *H* genes respectively. Progeny analyses up to F_3 are presented. Resistance in Kooperatorka was found to be controlled by *MM;* cross-over values for *M* with *T* and with *R* confirmed the linkage relationships of the three genes determined previously (cf. *PBA*, Vol. X, Abst. 1017 and Vol. XI, Abst. 956). Neither *M*, *T*, *R* or *H* were present in Minturki. F_3 distribution curves of Minturki x Baart suggested the cumulative effect of two weak genes; the first, designated *U*, permitted 42·5% infection in the homozygous condition and 55% infection when heterozygous; comparable values for the second, *V*, were 35 and 50%. Either *U* or *V* appeared to be linked with *R* and *T*. Since *X*, another weak gene, is known to be linked with *MRT* (cf. *PBA*, Vol. XVI, Abst. 728) it is possible that either *U* or *V* may be identical with *X*, otherwise there would be five genes for bunt resistance in one linkage group. It is pointed out that although weak genes with reinforcing effects are difficult to manipulate in a breeding programme, the combination of the *MXRT* linkage group, in a homozygous dominant condition, with other desirable agronomic characters should be readily achieved by back-crossing.

1085 Silva, A. R. da.
El concepto de raza fisiológica en el mejoramiento del trigo relativo a la resistencia a las royas de la hoja y tallo (*Puccinia rubigo-vera tritici* y *P. graminis tritici*). [**The concept of physiological race in wheat breeding with respect to resistance to leaf and stem rusts (*P. rubigo-vera tritici* and *P. graminis tritici*)**].
Arch. Fitotéc. Urug. 1952 : **5** : 131–36.

Reference is made to the existence of subraces such as 15B and 126B of stem rust, and to other cases where the differential hosts used have proved inadequate for the purpose of breeding resistant varieties. The suggestion is put forward that subsidiary differential hosts should be established from time to time and for particular regions. The need for hosts capable of revealing differences in mature plant resistance, such as exist in the case of race 15, is specially stressed.

1086 Boasso, C. S. and Levine, M. N.
Roya de la hoja del trigo *Puccinia rubigovera tritici* en el Uruguay. (**Leaf rust of wheat, *P. rubigovera tritici*, in Uruguay**).
Arch. Fitotéc. Urug. 1952 : **5** : 21–31.

A study was made of the physiological forms occurring in the years 1944 and 1949. A total of 27 races was detected, including race 15 which was absent in 1944 but present in 1949. The only wheat resistant to all races was Cappelli, whilst Gabo and Lee resisted all but the Uruguayan form of race 15. Races 5, 13, 20, 31 and 86 from Uruguay proved incapable of attacking Thew, in contrast to their N. American counterparts. Differences between the reaction of certain varieties such as Frontana and Frontón were detectable when tested with Uruguayan biotypes but not with biotypes from the USA, and both Klein Titán and Río Negro proved less resistant to Uruguayan than to N. American biotypes.

1087 Heyne, E. G.
Inheritance of leaf rust, *Puccinia rubigo-vera tritici* (Erikss. and Henn.) Carl., reaction and other characters in crosses among three wheat varieties.
Diss. Abstr. 1952 : **12** : No. 4136 : 560–61. (Abst.).

Inheritance of reaction to leaf and stem rust was studied in crosses involving Pawnee, Red Chief and Timstein. In the seedling stage, Timstein was resistant to leaf rust races 5, 9, 15, 44 and 126; Pawnee was resistant to race 9; and Red Chief was susceptible to all five races. In the field Timstein was resistant to these races and others; Pawnee and Red Chief were susceptible. Mature plant resistance to leaf rust depended upon a major recessive factor and one or more modifiers in the cross Pawnee x Timstein; data from Red Chief x Timstein suggested that mature plant resistance was determined by two recessive genes, one with a major effect, the other with a modifying or additive influence. Timstein carried one major dominant gene for adult plant resistance to stem rust. The seedling resistance of Timstein to races 5, 9, 15, 44 and 126 of leaf rust was determined by a major recessive factor and one or more modifiers. Pawnee possessed a dominant major gene for seedling resistance to race 9, epistatic to the major gene of Timstein. In crosses involving Timstein, approximately one half of the lines with a high degree of adult plant resistance to leaf rust were also highly resistant in the seedling stage to the five individual races. The resistance to race 9 of leaf rust shown by Pawnee and the field resistance of Timstein to stem rust had a recombination value of 21·8 ± 7·8%.
Pawnee carried one gene pair for red grain colour, differing from the two pairs for this character in Red Chief. Awn expression depended upon one factor pair, the production of awnlets in Timstein and Red Chief being almost dominant over the bearded condition of Pawnee.

1088 MARTINEZ M., L.
Inheritance of reaction to leaf rust, *Puccinia rubigovera tritici* (Eriks.) Carleton, and of certain other characters in a wheat cross.
Diss. Abstr. 1952 : **12** : No. 3652 : 371–72. (Abst.).

A study was made of the inheritance of reaction to leaf rust races in a cross between the susceptible variety Thatcher and resistant selection II–39–2 (Premier x Bobin-Gaza-Bobin). Mature plant reaction to a collection of leaf rust races under field conditions was determined by three independent pairs of genes, susceptibility being dominant. Seedling reactions to leaf rust races 1, 2, 5, 15, 28 and 128a were controlled by six genes, the reaction to each race depending upon a different gene; susceptibility was dominant. Evidence was obtained that the six genes were linked. Interaction between two gene pairs determined seedling response to each of the races 3, 58, 126 and to a bulked collection of 18 races of leaf rust. Association studies of seedling reactions to individual races indicated that a minimum of 8, and probably 12, genes controlled seedling response to the above 9 separate races.

Mature plant reaction to a number of stem rust races under field conditions appeared to depend on one major gene. The susceptibility of II–39–2 was dominant over the moderate resistance of Thatcher.

A single factor pair controlled awn production. The presence of awnlets in Thatcher was dominant over the bearded condition of II–39–2.

1089 SHUKLA, T. N.
Variability in resistance of certain wheat varieties to *Puccinia graminis tritici* race 15.
Diss. Abstr. 1952 : **12** : No. 3641 : 346–47. (Abst.).

The effects of environmental factors, chiefly temperature and light, upon the reaction of nine wheats to stem rust races 15 and 15B, were investigated at Minnesota University. Marquis, Mida, Mindum and Stewart were susceptible to both races under all conditions. The resistance of Lee to 15 and its susceptibility to 15B were not changed by the environment, nor was the moderate susceptibility of Frontana to both races. Newthatch was resistant to 15 at 60–65° and 70–75° F, but susceptible at 80–85° F; its reaction to 15B was not appreciably altered by temperature. Light as well as temperature determined the reactions of Kenya 117A and Kenya 58 to both races.

1090 HIRATSUKA, N. and SUEOKA, M.
(**On the susceptibility of species of *Triticum* and *Aegilops* to wheat leaf rust**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 199. [Japanese]. (Abst.).

Triticum monococcum, *T. durum* and *T. polonicum* are resistant to *Puccinia triticina*; *T. Timopheevi* is immune. *Aegilops* spp. are less promising as a source of resistance, but some resistance is found in such species as *Ae. biuncialis*, *Ae. umbellulata*, *Ae. comosa* and *Ae. speltoides*.

1091 FOKIEV, P. M.
(**Spring wheat cultivated under irrigation in the trans-Volga region**).
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. 3 : 19–31. [Russian].

In trials at the Bezenčuk State Breeding Station and the Institute of Agriculture of the Southeast, several new wheats proved productive when grown in irrigated fields, in addition to some standard varieties and the branching Kahetian wheat. The new varieties bred at the first-named institute include the soft wheats Albidum 1529 and Lutescens 1531, which outyield the new standard Lutescens 605 and the hard wheat Melanopus 1528. These new varieties carry a higher degree of resistance to rust and lodging than the standard varieties.

The new soft wheats developed at Bezenčuk, Erythrospermum B–G98 and Lutescens B–35, and the hard wheat, Leucurum B–935, are adapted to cultivation upon black earths in the northern irrigation zone.

1092 ÅKERMAN, Å.
Svartrostangreppet på vete. (**Black stem rust attack on wheat**).
LantbrVeckan 1952 : 222–24.

In this discussion on J. Mac Key's paper (cf. Abst. 1093) the speaker expressed his views on varietal resistance to rust attack in wheats in Sweden (cf. Abst. 1010) and on the work at the Östgöta station in breeding for resistance (cf. Abst. 251).

1093 MAC KEY, J.
Svartrosten och veteförädlingen. (**Black rust and wheat breeding**).
LantbrVeckan 1952 : 205–21.

The substance of this lecture has already been reviewed from another source (cf. Abst. 251).

1094 WÅLSTEDT, I.
Erfarenheter rörande svartrostangreppet på vete i Sveriges Utsädesförenings Östgötafilials område och i försöken 1952. (**Experiences regarding the black stem rust outbreak on wheat at the Östgöta Branch Station of the Swedish Seed Association and in trials in 1952**).
LantbrVeckan 1952 : 224–29.

Following J. Mac Key's paper (cf. Abst. 1093) the writer gave his views on the incidence of rust in Östergötland and possible causes of the epidemic, the biotype question in Sweden, and varietal resistance. He also mentioned the resistant transgressive forms found at Tornby, specially of autumn wheat, and indicated how such forms judiciously used in combination may play an important role in improving resistance.

1095 Colecciones de trigo para localizar las fuentes de resistencia a royas. (**Wheat collections for locating the sources of rust resistance**).
Idia 1952 : No. 54 : p. 47.

A large collection of wheats is under observation at the Castelar Plant Breeding Institute, Argentina, with particular attention to the possibility of finding forms resistant to race 15B of *Puccinia graminis* var. *Tritici*.

1096 PAINTER, R. H., JONES, E. T. and HEYNE, E. G.
Hessian fly resistance of Ponca wheat.
J. Econ. Ent. 1952 : **45** : 778–83.

The high degree of resistance shown by Ponca [(Kawvale x Marquillo) x (Kawvale x Tenmarq)] wherever it has been grown in the USA since its release (cf. *PBA*, Vol. XXII, Abst. 1096) is attributed to the combination of resistance possessed by Kawvale and Marquillo. It is suggested that Ponca might effectively reduce losses due to Hessian fly in eastern Kansas where Pawnee (Kawvale x Tenmarq) has proved susceptible.

1097 PIZZORNO PEREIRA, J. and FISCHER, G. J.
Ensayos chacareros complejos. (**Complex experiments in fields**).
Arch. Fitotéc. Urug. 1952 : **5** : 137–48.

A complex set of field experiments set up to test the influence of various treatments on grain yield in 16 wheat varieties showed, among other things, that the variety DQ 3(150)2 was distinctly superior to the rest.

1098 WALKER, A. J. K.
Results of wheat variety trials, 1948-51.
J. Dep. Agric. S. Aust. 1952 : **56** : No. 2 : 60–69.

Data are presented to indicate those varieties best suited to the different wheat growing areas of South Australia. The chief characteristics of the outstanding wheats are discussed briefly.

BUCKWHEAT

1099 MURAKAMI, K.
(**On the physiology of artificial polyploids. II. The content of water and total nitrogen in different organs of autotetraploid buckwheat**).
Ikushugaku Zasshi/Japan J. Breeding 1952 : **1** : p. 194. [Japanese]. (Abst.).

The overall contents of water and total N in diploid and autotetraploid strains were not markedly dissimilar, though differences were noted in comparisons of individual organs.

1100 KATAYAMA, Y. and NAGATOMO, T.
(**Some characters in buckwheat relevant to breeding**).
Ikushugaku Zasshi/Japan J. Breeding 1952 : **1** : p. 196. [Japanese]. (Abst.).

A comparative study on *ca.* 90 varieties is reported with special reference to vegetative period and to the physiological distinction between summer and autumn types.

OATS

1101 ROBB, W.
Plant breeding experiments, 1920-1950. Cereals Section, Scottish Plant Breeding Station, Edinburgh.
Trans. Roy. Highl. Agric. Soc. Scot. 1951 : **63** : 9–25.

The survey is devoted mainly to oat breeding, already referred to in *Plant Breeding Abstracts* in summaries of previous papers and of the annual reports of the station. In addition to the chief objectives of hulled oat breeding, work on huskless oats, oats for alkaline soils, transgressive types, and the inheritance of empty grain, grain colour and leaf striping is described.

1102 CHAPMAN, W. H.
Southland oats—a new variety.
Circ. Fla. Agric. Exp. Sta. 1950 : No. S–18 : Pp. 8.

An account is given of the origin and characteristics of the variety (cf. *PBA*. Vol. XXI, Abst. 263).

1103 MOREY, D. D. and EARHART, R. W.
Golden oats.
J. Hered. 1952 : **43** : 181–82.

Golden or yellow mutant seedlings appearing in CI 5395, a selection from CI 5208 (Hancock-Morota-Bond x Fultex), at Gainsville, Fla., retained their yellow colour until maturity and gave grain yields approaching normal. The chlorophyll deficiency has bred true for several generations and is inherited as a simple recessive in crosses with normal green varieties. Similarities between these golden mutants and a chlorina mutant of Golden Rain oats in Sweden (cf. *PBA*, Vol. XI, Abst. 962 and Vol. XVI, Abst. 1721) are indicated. It is suggested that golden oats may be used as markers for separating experiments in nurseries and for studying natural crossing and genetic linkage.

1104 RYBAKOVA, M. I.
(**Heterosis in vegetative hybrids between oats and wheat**).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **79** : 541–43. [Russian].

Embryos of the oat Soviet were grafted on one or two endosperms of the wheats Lutescens 62 and Hordeiforme 189. Analyses of the first seed generation showed that heterosis occurred in respect of length of straw, tillering capacity, number of grain-bearing spikelets, number of spikelets and the yield of grain per plant. The heterotic effects were intensified when two endosperms served as the stock for each graft. Several first seed generation plants of Soviet on Lutescens 62 showed changes in grain colour. Some grafted and first generation plants of Soviet on Lutescens 62 and Soviet on Hordeiforme 189 produced supplementary inflorescences at the nodes close to the base of the panicle.

1105 NAWROCKI, Z.
Studia biometryczno-hodowlane. Cz. II. Zawartość łuski w ziarnie owsa w świetle współzależności z niektórymi innymi jego mierzalnymi cechami. (**Biometric and breeding studies. Part II. The glume percentage of the oat grain in the light of the correlation between glume percentage and some other measurable characteristics of the grain**).
Ann. Univ. M. Curie-Skłodowska 1951 : **6** : 383–427.

A statistical study, using numerical results from 16 varieties of oats, showed that coefficients in equations derived by the author from 1000 corn weight and hectolitre weight are better criteria for judging individual varieties than the arithmetical mean value for the percentage of glumes.

1106 MURPHY, H. C.
Problems involved in breeding oats for disease resistance.
Phytopathology 1952 : **42** : 482–83. (Abst.).

A brief account is given of the effects of the extensive cultivation of Bond and Victoria derivatives upon the prevalence and severity of certain diseases and of races of pathogens in the United States. Varieties resistant to *Helminthosporium Victoriae*, all races of rust and smut known to be present in North America and also to some minor diseases are now being developed; it is however pointed out that increase in acreage of these new varieties will probably be accompanied by additional diseases and races.

1107 SALOHEIMO, L.
Hallakesät ja kauran hallavahingot Karjalan suokoeasemalla. (**Early autumn frosts and frost damage to oats at the bog experimental station of Karelia**).
Koetoiminta Käytäntö 1951 : **8** : No. 5 : p. 4.

Kultasade II [Golden Rain II], Sol II [Sun II], Sisu, Juha, Eho, Kytö, Tammi and Orion III, representing late, medium and early varieties of oats, were grown in Finland on a low-lying peat bog subject to early autumn frosts in 1948, 1949 and 1950. The yields of grain and straw, germination percentage and 1000 grain weight were recorded and compared with the results obtained in 1946, when autumn frosts began only after the crops had fully matured. The conclusion drawn is that, on peat bogs, the yield of grain from early varieties is not significantly greater than from the later varieties.

1108 **Release new Floriland oats for Gulf Coast.**
Seed World 1952 : **71** : No. 8 : p. 18.

Floriland, developed from a cross between Fla. 167 and Landhafer, is suitable for the Gulf Coast region of the United States. It is highly resistant to crown rust and Victoria blight; it is susceptible to stem rust but often escapes attack as a result of early maturity. It provides good grazing from late November until the end of February, and has outyielded Red Rustproof 14 and Camellia. It has strong straw and is well-suited to combine harvesting.

1109 SIMONS, M. D. and MURPHY, H. C.
Physiologic specialization in *Puccinia coronata* Corda var. *avenae* F. and L.
Phytopathology 1952 : **42** : 474–75. (Abst.).

The following set of differential varieties of oats is recommended for the identification of crown rust races: Anthony, Victoria, Appler, Bond, Landhafer, Santa Fe, Ukraine, Trispernia, Bondvic and Saia.

1110 HINGORANI, M. K.
Factors affecting the survival ability of certain physiologic races of *Puccinia graminis avenae* Erikss. & Henn.
Phytopathology 1952 : **42** : 526–31.

Analyses of the differential reactions of 49 varieties of oats inoculated with isolates of races 2, 7 and 8 obtained from the Federal Rust Laboratory, St. Paul, Minn., have shown that race 8 is the most virulent. No variety was immune, but Hajira x Joanette and Victoria x (Hajira x Banner) were resistant to all three races. The uredospores of race 8 germinated better and faster than those of either 2 or 7; race 2 proved most sensitive to the influence of light and temperature.

Selfing studies carried out with race 7 indicate that this strain is homogeneous with respect to factors for pathogenicity on Bond, Minrus and Jostrain, but evidence for the existence of several biotypes was obtained from quantitative differences in virulence of isolates on Richland.

1111 MURPHY, H. C. and ATKINS, R. E.
Clintafe oats . . . its record.
Iowa Fm. Sci. 1952 : **7** : No. 5 : 3–5.

This variety, developed at the Iowa Agricultural Experiment Station from Clinton x Santa Fe, possesses most of the desirable characteristics of Clinton, but has, in addition, a high degree of resistance to race 45 of crown rust. It has outyielded Clinton by 8 bushels per acre in all parts of the state and is therefore recommended to growers, particularly in northern Iowa.

1112 ISMAIL ALI IBRAHIM.
Studies on the effect of some environmental conditions and chemicals on the development of *Puccinia graminis avenae* Erikss. and Henn.
Diss. Abstr. 1952 : **12** : No. 3947 : 345–46. (Abst.).

According to the temperature, oats such as Garry, Hajira x Joanette and Victoria x (Hajira x Banner), possessing the Hajira type of stem rust resistance, varied considerably in their responses to races 6, 7 and 8 in experiments at Minnesota University. Varieties with the Richland or White Tartar type of resistance, such as Andrew or Mindo, were very stable in their seedling reactions to these races at 70–90° F. Seedling or field reactions to the three races were in general not appreciably influenced by chemical conditions, e.g. excess of trace elements or spraying with 2,4-D. Certain races survived better than others when grown together in mixture with another race for successive generations.

1113 STANIFORTH, D. W. and ATKINS, R. E.
Effect of 2,4-D on yield and bushel weight of oats.
Agron. J. 1952 : **44** : 587–89.

Grain yields of six commercial varieties grown at Ames, Ia., in 1949 and 1950 were significantly reduced by treatment with 2,4-D at the time of initiation of floral primordia. Mindo and Colo were more susceptible than Benton or Shelby, while Marion and Clinton were least affected. Yield reductions were due to abnormalities of the inflorescence which resulted in fewer seeds per panicle.

1114 **Oats. Variety and strain tests at the Dominion Experimental Farms 1951.**
Ottawa 1952 : No. 128 : Pp. 67. (Mimeographed).

Tables summarize the results of extensive trials of varieties and hybrid strains in Canada during 1951.

RYE

1115 DMITRIEV, V. S.
(**Questions of the development of species and the control of weeds**).
Sovetskaja Agronomija (Soviet Agronomy) 1952 : No. 4 : 17–27. [Russian].

Instances of conversions of rye into 28-chromosome *Bromus secalinus* are reported and discussed in the light of Lysenko's evolutionary theories (cf. *PBA*, Vol. XXI, Abst. 2500). The climatic conditions of north-western Russia, low lying ground and excessive soil moisture are believed to be mainly responsible for the spontaneous origin and development of this weed in rye fields.

1116 FERWERDA, F. P.
Enkele problemen uit de roggeveredeling.
(**Some problems in rye breeding**).
Tweede Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1952 : 56–60.

Problems of diploid rye breeding are discussed. A method is required whereby rye clones could be maintained in the vegetative state for a few years, so that selection could be carried out in the young stage for characters such as disease and pest resistance, as well as for the characters that can only be judged after flowering.

The failure to evolve a breeding system based on heterosis in rye may be due to the fact that, in developing inbred lines, unconscious selection for self fertility occurs and even cleistogamy may be favoured. As emasculation is impractical with the small rye florets, only the discovery of male sterile types would offer a chance of ensuring complete cross pollination.

Another possible method would be hybridization of *Secale cereale* with the perennial wild ryes *S. montanum* or *S. Kuprianovii*, followed by colchicine treatment to improve fertility.

1117 Petersen, W.
Tetraroggen in der Bewährung. (**Tetra rye and its later behaviour**).
Mitt. dtsch. LandwGes. 1952 : **67** : 724–26.

The tetraploid rye produced in 1938 by the seed firm F. von Lochow had a fertility of only 15% but by continued selection it has been raised to 80%. It was certified as a new variety in 1951 and in autumn of 1952 ample seed will be available on the market. It can only be grown at a distance of over 300 m. from diploid winter rye. It requires and tolerates higher nitrogen dressings than diploid rye, owing to its stronger straw, which also makes it more suitable for combine harvesting, and even for growing in mixtures with winter vetch. It yields well on the lightest sandy soils, where even in dry years it has given up to 26 centners per ha. of grain, and on ordinary soils it has exceeded the diploid by up to 30% in yield of both grain and green matter. In maturity it is somewhat later than diploid rye.

1118 Ognev, I.
(**The winter rye variety Partizanskaja Mestnaja**).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : 54–55. [Russian].

Partizanskaja Mestnaja [Local Partisan] was obtained by open pollination of Petkus with Vjatka, Novozybkovskaja 4 and some local White Russian varieties. It is a mid-season variety with a higher 1000 seed weight than Novozybkovskaja 4 and Vjatka. It is productive and hardy and shows resistance to drought, lodging and shedding.

1119 Seinhorst, J. W.
Een nieuwe methode voor de bepaling van de vatbaarheid van roggeplanten voor aantasting door stengelaaltjes (*Ditylenchus dipsaci* [Kühn] Filipjev). (**A new method for testing the susceptibility of rye plants to attack by the stem eelworm *Ditylenchus dipsaci* [Kühn] Filipjev**).
Tijdschr. PlZiekt. 1952 : **58** : 103–08.

The method is based on Bingefors' technique for estimating stem eelworm attack in red clover (cf. *PBA*, Vol. XXI, Absts. 396 and 1919). The rye seedlings are inserted in slits in thick filter paper pads which are put in an aluminium holder and then placed vertically in a box with other pads. In this way 500 seedlings can be raised and individually studied. When about 2 cm. long, the seedlings are inoculated with a suspension of infective larvae in carboxymethyl-cellulose.

1120 Forsøg med rugsorter 1946–51. (**Trials with rye varieties, 1946-51**),
Tidsskr. Planteavl 1952 : **56** : 151–54.

At ten research centres in Denmark, nine Danish and Swedish ryes underwent trials on heavy and light soils. Yield, lodging, hectolitre weight and kernel weight are tabulated. On good soil the highest yielding was Borris Perlerug [Borris Pearl rye] while on light sandy soil Perlerug and Petkus were equal. Kungs II [King's II], a Svalöf selection of Stål [Steel], was the stiffest-strawed variety, but its yield of grain and straw was low.

1121 Strand, E.
Resultater av sortforsøk med høstrug på Sør-Østlandet for årene 1937–38 til 1949–50. (**Results of variety trials with winter rye in South-eastern Norway for the years 1937-38 to 1949-50**).
Forskn. Fors. Landbr. 1952 : **3** : 49–67.

The results are recorded of 44 field trials of 13 Norwegian, Swedish, Estonian and German varieties; the Norwegian land rye, Refsum, was used as the control. Kungs II [King's II], which had the shortest and stiffest straw, gave the highest yield, but where it would not be winter hardy enough, the Norwegian variety Grårug 0114 [Grey rye 0114] is recommended. The Estonian variety, Sangaste, with its long but stiff straw, is not only winter hardy but also very resistant to damage by freezing of the soil in spring. Bjørn [Bear], reported to be very winter hardy, proved practically a total loss, owing to winter killing, probably due to lack of resistance to winter fungi.

MAIZE

1122 Villax, E.
Le maïs en Hongrie. (**Maize in Hungary**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 403–12.

A full account is presented of the history and development of maize selection and breeding, with information on the varieties grown and the production of hybrid maize, a method which had already been initiated on an empirical basis in about 1900 in Hungary. Comparative trials, begun in 1947, have shown the American hybrids tested to be too late for Hungarian conditions. Though the production of selfed lines for breeding hybrids exhibiting heterosis began in 1943, this material was lost and Hungary now grows improved varieties obtained by the former method of removing the tassels of alternate rows and taking the seed only from plants whose male flowers had been eliminated. The dent varieties, Mindszentpusztai and Aranyözön [Golden Rain], and the flint varieties Mindszentpusztai fehér gömb [Mindszentpusztai Round White] and Bellyey Pignoletto were obtained in this way.
The writer's experiments have shown that seed with a germination capacity as low as 70–80% gives smaller plants and a lower yield.
The problem of resistance to *Ustilago Maydis* and lodging is being investigated.

1123 Larroque, M.
Bases scientifiques de la nouvelle méthode de sélection rapide des plantes basée sur la considération des complexes héréditaires. (**Scientific bases of the new rapid method of plant selection based on a consideration of hereditary complexes**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris, 1949 (1950) : 137–55.

An account is given of the author's method of breeding, which is based on the identification of the hereditary complexes in any given population, and on the subsequent selection of the complexes comprising the characters desired (cf. *PBA*, Vol. XIX, Absts. 3 and 1994).

1124 Vanjkov, G. A.
(**High yields of maize over a large area**).
Sovetskaja Agronomija (Soviet Agronomy) 1952 : No. 9 : 43–47. [Russian].

Bukovina 1, bred at the Černovickaja Research Station from Voronež 76 x Zubovidnaja 3135 [Dent 3135], is earlier and 30–40% more productive than the local variety Bessarabka [Bessarabian]. It has been made a standard in the Černovickaja and Stanislavskaja provinces. An improved line of Zubovidnaja 3135 has been selected. It is later than Bessarabka, but its yield is appreciably higher.

1125 Kay, R. and Phinney, B.
The control of chlorophyll and carotenoid production by a virescent gene in maize.
Genetics 1952 : **37** : 593–94. (Abst.).

The character of virescent, pale yellow seedling is due to a simple gene mutation controlling both carotenoid and chlorophyll accumulation. Whether grown in the light or dark, mutant seedlings are pale yellow. At room temperature the pale yellow character persists for about two weeks; one week later the mutants are as green as normal seedlings. Previous exposure to light, variations in the culture media, removal of endosperm, and size and number of plastids do not affect the duration of the pale yellow stage. The length of time that the mutants remain pale yellow is however inversely proportional to the temperature. The lag in the time at which initial greening occurs is attributed to lack of a threshold amount of an enzyme, whose accumulation is dependent upon the temperature. Dark-grown mutants are low in carotenols and protochlorophyll, but not in carotenes; light-grown mutants are deficient in carotenols, chlorophylls and carotenes. Accumulation of carotenols and protochlorophyll begins at the same time in either light or dark grown seedlings. Ways in which carotenoid and chlorophyll synthesis may be controlled in the mutants are suggested.

1126 **Report of the FAO Hybrid Maize Meeting held in Clermont-Ferrand, France, 23-26 January, 1951.**
FAO, Rome 1951 : Pp. 35. (Mimeographed).

Low temperature germination tests, methods of evaluating inbred lines, recurrent selection and the possible use of male sterility for the elimination of detasseling were considered, mainly with reference to American work relevant to problems in Europe. Committees were established to deal with cooperative uniform tests of inbreds of European and Near East origin. Silage maize trials were discussed.

M. Blanco drew attention to work in Spain on pollen grain size as a basis of selection in inbreds; a correlation has been found between pollen size and combining ability. Varietal testing for borer resistance in Spain and the present procedure of breeding for borer resistance in the United States were discussed. Maturity ratings of American hybrids in the United States and in Europe and North Africa were compared.

1127 **Report of the fifth FAO Hybrid Maize Meeting, Zurich, Switzerland, 5-9 February 1952.**
FAO, Rome 1952 : Pp. 46. (Mimeographed).

Procedures to be adopted in the cooperative uniform tests of inbred lines developed in Europe and the Near East were decided. In future, tests are to be carried out on this material, instead of American hybrids, on which sufficient data will have been obtained by the end of the 1952 season. Other matters discussed included testing and selection for cold hardiness, and American work on the use of cytoplasmic male sterility for the production of hybrid seed without detasseling. M. T. Jenkins described the procedure for predicting the performance of double crosses from single cross data usually employed in the United States. F. Bachmann analysed criteria for evaluating varieties for silage. Reports are given of the results of the FAO uniform hybrid maize trials carried out in European countries, Algeria, Morocco and Egypt during 1951.

1128 ALABOUVETTE.
Organisation de la production de semences de maïs. (**The organization of the production of maize seed**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 91–120.

The French populations of maize are discussed, together with the steps that are being taken for their improvement and ultimate use in the production of double hybrids. The qualities of foreign varieties and the earliness of US hybrids are considered (cf. *PBA*, Vol. XXII, Abst. 1856). Instructions are appended for the information of growers of inbred lines, and producers of single and double hybrids.

1129 GADEA, M.
Los híbridos de maíz americanos. (**American maize hybrids**).
Agricultura, Madrid 1952 : **21** : 247–52.

After an outline of the history of hybrid corn in the USA, an account is given of Spain's part in the FAO cooperative maize breeding programme for Europe and the Near East. The results of the first three years have shown the American hybrids to be clearly superior to local varieties in yield and also in resistance to smut and lodging, though more susceptible to damage by insects (*Pyrausta* and *Sesamia*); they have given yields of up to 100,000 kg. per ha. in some cases, outyielding local standards sometimes by as much as 200% (cf. *PBA*, Vol. XXII, Abst. 2654).

1130 LAUBSCHER, F. X.
Report of the First Annual Maize Breeders Conference of the Union of South Africa, College of Agriculture, Potchefstroom 1952 : Pp. 30. (Mimeographed).

Saunders, A. R. Historical review of maize breeding at Potchefstroom. (pp. 1–2).

Work on maize improvement since the first introduction of varieties from the USA in 1907 is briefly outlined.

Rattray, A. H. Report on maize work in Rhodesia. (p. 2).

Inbreds developed from Salisbury White form the basis of present day hybrids. The increased yield of hybrids compared with open-pollinated varieties may be up to 84%.

Hoyle, S. T. Report on maize work in Nyasaland. (p. 2).

Inbreeding was initiated in 1948. Work is being concentrated upon local native flint stocks.

Sellschop, J. P. F. Discussion on distribution of varieties. (pp. 2–3).

Information is given on the distribution of white and yellow types of dent and flint maize in South Africa.

Josephson, L. M. Potschefstroom Experiment Station. (pp. 3–5).

Work on the production of inbreds and hybrids of white and yellow flints and dents is surveyed in detail. Sweet corn breeding is continuing. Attention is now being given to developing yellow sweet corn for canning. The popcorn breeding programme has been revived since yellow varieties are desired by the industry.

Hofmeyr, J. D. J. Pretoria University. (*p. 5–6*).

Inbreeding of Potchefstroom Pearl, American Flint and other varieties is in progress. Protandry is being studied in connexion with the problem of ensuring adequate pollination, particularly in the drier and less favourable districts. Inbred lines have ranged from extreme forms of protandry to a full exposure of the silks before pollen shedding.

Bogyo, T. P. Natal Agricultural Research Institute. (*pp. 6–8*).

The main problem of breeding is the production of lines resistant to *Helminthosporium* and streak virus. In addition to the usual method of hybrid breeding, improvement by a modified method of recurrent reciprocal selection for general combining ability is being attempted (cf. *PBA*, Vol. XXII, Abst. 1865). In this method S_2 inbreds from source A are top-crossed with open-pollinated plants from source B and *vice versa*, the inbred lines being used as female parents. The 10 lines with the highest combining ability in each group, as shown by the top cross tests, are then intercrossed in all possible combinations and the crosses bulked in equal quantities. Commercial hybrid seed is produced by crossing the two synthetics. Alternatively, equal quantities of the 10 highest yielding inbreds in each group are bulked separately, and crossing of the two groups provides the commercial hybrid. Further cycles of breeding will be carried out according to this main plan, each time beginning with the synthetics of the previous cycle. The first top crosses have been made, using Hickory King and Potchefstroom Pearl as the two sources. Most drought resistant lines behaved very uniformly even after only the second selfing; apparently a high correlation exists between drought resistance and general agronomic features other than disease resistance.

Grogan, C. O. Bethlehem Research Station. (*pp. 8–10*).

Early types are required for the Bethlehem area, Orange Free State. Breeding is discussed with reference to yield, disease and insect resistance and other characters. The development of suitable hybrids of both dent and flint maize is to be attempted, although so far the dents tested have not been as satisfactory as the flints. At present 725 different hybrid combinations are being subjected to performance trials. Sweet corn and popcorn breeding is also in progress.

Laubscher, F. X. Maize breeding methods. (*pp. 11–22*).

Many of the new methods of breeding are based upon the theory of overdominance and aim at the production of an increase in the frequency of desirable genes in a random breeding population. Arguments are given in support of the author's contention that if heterosis in maize depends largely upon overdominance, it cannot be utilized to a high degree in open-pollinated populations. Brieger's concept of balanced populations is regarded as incorrect (cf. *PBA*, Vol. XX, Abst. 726). The technique of reciprocal recurrent selection proposed by Comstock *et al.* is examined (cf. *PBA*, Vol. XX, Abst. 263). The method is criticized on the grounds that it aims at increasing the frequency of *B* without positive regard to the frequency of *b* in the other parent; it may therefore depart from the ideal of increasing *B* in one stock and *b* in the other. This defect may be minimized if the two original parental stocks are sufficiently divergent in gene frequencies. Recurrent selection against an inbred tester should prove valuable as a means of obtaining an adequate shift in gene frequencies in the two parental stocks.

The problems of improvement of existing varieties, pending the production of hybrids, or for use in marginal areas, are discussed. The modern techniques of evaluating inbreds should be applied in varietal improvement.

Josephson, L. M. Utilization of American inbreds. (*pp. 18–19*).

Some American lines, e.g. K 64, 33–16 and N 72, are well-adapted to South African conditions and can be used directly in hybrid production, but the majority are poorly adapted. Methods of hybridization and selection to obtain adapted strains with the high combining ability of the American lines are suggested.

Grogan, C. O. Breeding for insect and disease resistance. (*pp. 19–22*).

The possibilities of breeding for resistance to pests and diseases in maize are discussed in preliminary comments by C. O. Grogan and subsequently by several other speakers.

Josephson, J. M. Numbering systems for hybrids and inbreds. (*pp. 23–25*).

Proposals are made concerning numbering systems for inbreds and hybrids.

Hofmeyr, J. D. J. Propagation of inbreds and the maintenance of their genotypes. (*pp. 25–26*).

Problems of propagation and maintenance of inbreds are examined.

1131 Tremblay, J. -H.
Le maïs au Canada. (**Maize in Canada**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 457–63.

Maize hybrids suited to the regions served by the Harrow and Morden Federal Experimental Stations and the Central Experimental Station of Ottawa have been produced. Harrow Experimental Station has produced three new hybrids, Harvic 222, Harvic 300 and Harvic 333, while the Ottawa Station has produced Canbred 150 and Canbred 250 for commercial production.

1132 Vélez Fortuño, J.
Corn-breeding work in Puerto Rico.
J. Agric. Univ. P.R. 1952 : **36** : 12–23.

At the Mayagüez Experiment Station and various substations, over 500 promising maize selections from indigenous and foreign stocks are being selfed. A number of inbreds, selected on the basis of their performance when top-crossed with the local standard, Mayorbela, have undergone tests in all possible single cross combinations. Preliminary results indicate that several pure lines have a sufficiently high specific combining ability to be used for hybrid production.

Meanwhile, as a short term measure, the effectiveness of Harland's method for the improvement of open-pollinated varieties (cf. *PBA*, Vol. XVII, Absts. 26 and 460) is being determined.

1133 Jenkins, M. T.
Report of the Seventh Northeastern Corn Improvement Conference, New York City, New York, January 25-26, 1952.
Div. Cereal Crops Dis. Bur. Pl. Indust. Soils Agric. Engng. Beltsville, Md. 1952 : Pp. 25. (Mimeographed).

Brief reports are presented of the activities and recommendations of the various committees concerned with trials of maize inbreds and hybrids, testing for cold tolerance and sweet corn investigations.

One session was devoted to recent developments in the study of cytoplasmic sterility. H. L. Everett described work on three cytoplasmic male-sterile lines now under consideration for commercial use: USDA Teopod, Texas and Kys. D. F. Jones discussed the commercial use of male sterility, and the behaviour of different sterile lines and genes restoring pollen production.

In addition, reports are given of investigations at 11 state stations. The following work is of chief interest:—

Connecticut

The dominant gene Ragged has been incorporated in lines of field maize. By maintaining this gene in the heterozygous condition, the plants are kept in a greatly reduced state of growth and reproductive ability; only a few plants can survive. After several generations of selection, the lines will be compared with similar ones not handicapped by this gene.

Single dominant marker genes and neighbouring regions on the chromosomes are being investigated with regard to their effect upon heterosis. Yellow endosperm, red cob and nonglossy seedlings, the dominant marker characters used, have themselves no appreciable effect upon vigour.

Single crosses between lines with high sugar content show a reduction in sugar percentage compared with the inbred parents, but an increase in the total amount of sugar on account of the much larger stalk weight. The character of high content may be useful for silage maize (cf. Abst. 1169); it also appears to be associated with desirable stalk qualities and some disease and insect resistance.

A fourth type of cytoplasmic sterility found in a yellow flint maize from Turkey is being added to inbreds that already carry cytoplasmic sterility, derived from Mexican June, Teopod, and Tropical Flint from Brazil.

The Mexican June and Teopod types of sterility have been incorporated in many standard seed parent inbreds, which have now been maintained in a completely pollen sterile condition for several generations.

Yields of seed from the sterile single crosses have been appreciably more than the yields of the same fertile seed parents detasselled.

Genes for the complete restoration of pollen production in the final crop grown for grain are being transferred to widely used pollinators.

In sweet corn breeding the dominant gene for vestigial glume character is being incorporated in P 39 as seed parent, selection being made for increased pollen production in combination with completely glumeless ears.

New Jersey

Maize breeding is concentrated upon resistance to *Gibberella* stalk rot and its inheritance.

Male sterile lines of both the genic and cytoplasmic types are being developed. Two-eared strains are also being produced, for their possibly greater adaptability. Partial dwarf characteristics are being transferred to a number of standard inbreds.

Sweet corn breeding for resistance to bacterial wilt and smut, higher production, better quality and early maturity continued. Convergent improvement is being successfully used to improve inbreds of hybrids for use in large scale production.

New York

Field maize breeding at the Agricultural Experiment Station, Cornell University, includes work on (1) cytoplasmically male sterile lines and inbreds suitable for the restoration of pollen production; (2) establishment of inbreds with a diminutive mutant character, with the aim of obtaining vigorous hybrids with diminutive growth; and (3) development of completely homozygous inbreds by the monoploid technique (cf. *PBA*, Vol. XXII, Abst. 2669).

Sweet corn breeding at the Geneva station has as its main objective the development of heavy yielding selections with high quality for processing, and a time of maturity in advance of the main season for processing. The incorporation of cytoplasmic male sterility and vestigial glume in breeding lines has been undertaken.

Ohio

It has been found that large seeds tend to give rise to plants with higher yields and earlier time of silking than small seeds.

Pennsylvania

Breeding for resistance to *Helminthosporium turcicum* is reported.

1134 JENKINS, M. T.
Report on the Ninth Southern Corn Improvement Conference held at Knoxville, Tennessee, and Lexington, Kentucky, August 26-29, 1950.
Div. Cereal Crops Dis. Bur. Pl. Indust., Soils Agric. Engin., Beltsville, Md. 1950: Pp. 51. (Mimeographed).

Reports are given of the committees concerned with foundation seed stocks of maize; preservation of germ plasm; selection of lines for the southern uniform tests; and methods for the uniform designation of hybrids.

Station reports. (pp. 8–22).

Florida

Recurrent selection for specific combining ability is in progress. It is estimated that after one cycle of selections the yield has been increased by about 15% over that of Florida W-1.

Georgia

Breeding is being carried out at the Coastal Plains Agricultural Experiment Station to incorporate resistance to *Helminthosporium* spp. and *Physoderma* in inbred lines used for the production of commercial hybrids. Cytoplasmic male sterile lines are being studied. Using translocation material, investigation of the inheritance of husk length is being continued. A study is also being made of nematode resistance, derived from line NC 16.

A modified programme of "Huffmanization" with some of the older inbred lines is in progress; an outstandingly good S_2 row derived from the variety Huffman has been used as pollinator on both yellow and white lines; these crosses have now been subjected to the first selfing.

In breeding at the Georgia Agricultural Experiment Station, emphasis has been laid upon the development of relatively short inbreds with ears situated low on the stalk, strong roots, satisfactory husk development as protection against weevil, and high combining ability. Several promising lines have been isolated, in particular GE 129 and GE 45. A synthetic variety obtained by mixing approximately equal amounts of seed of the most promising southern yellow and white single crosses is being selfed in the hope that it will prove to be a good source of inbreds.

The hybrid Ga. 7147 (F 4 x F 3) x (T 61 x T 13) has given good results and its release is under consideration pending the results of the 1950 test.

Kentucky

Experiments have been carried out on male sterile test crosses. In order to reduce the amount of stalk breakage, an attempt is being made to develop hybrids with ears lower down on the plant. Inheritance of smut resistance is being investigated in crosses between the very susceptible line Ky 112 and highly resistant line Ky 39.

Louisiana

Yellow lines are being evaluated with the aim of developing a hybrid adapted to north Louisiana. Dixie 18, adapted to south Louisiana and the alluvial soils of the Mississippi and Red rivers, has proved to be the best yellow hybrid in tests during the past three years (cf. *PBA*, Vol. XVIII, Abst. 1572). Louisiana 521, a recently released white hybrid, continued to produce the highest yields in south Louisiana.

Mississippi

At the Delta Station, Stoneville, a search is being made for new inbreds of the varieties

Mosby and Kyle; early yellow hybrids for "hogging-off" are also being developed. Resistance to insects is being studied in cooperation with the Louisiana station.

North Carolina

Several inbred lines have exhibited a high degree of resistance to *Helminthosporium Maydis* and have imparted this character to their hybrid progeny. A third cycle of recurrent selection for specific combining ability is under test. Two programmes of reciprocal recurrent selection, one involving two synthetics and the other two single crosses, are under way. Cousin-mated families are being tested for their relative uniformity as regards combining ability. Synthetic varieties have been developed and are now being subjected to intravarietal selection based on progeny tests. Investigations on quantitative inheritance include the effects of intensity of inbreeding, and the genetics of grain yield, plant height and ear number.

Oklahoma

Breeding has been chiefly concerned with the development of inbreds from local open-pollinated varieties. Among the single crosses with least susceptibility to borer are those involving K 155, Ok. 12 and Ok. 22.

South Carolina

At present the most promising new material is being developed from back crosses of old standard lines.

Tennessee

White and yellow isolates from crosses between the Huffman variety and corn belt single hybrids have given encouraging results, particularly with respect to lodging resistance, attractive appearance and yielding ability. Studies of niacin content continued, in cooperation with Columbia University.

Texas

Considerable attention has been given to the improvement of older lines which gave high yields in hybrid combination but not resistance to lodging, diseases or insects. From the top cross Tx 17 2C x Yellow Tuxpan, an improved line with later maturity and much longer husks has been isolated. Tx 132A, a component of most yellow hybrids used in Texas, is extremely susceptible to lodging; an S_5 selection from Tx 132A has given good results when crossed on to a stiff-stalked line from the corn belt and it may be used to replace Tx 132A. Work is in progress to develop hybrids specially adapted to the extreme east and southeastern districts or to the drier regions of Texas.

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Recurrent selection for resistance to *Helminthosporium turcicum* was continued with good results. Strains of Hy and K 64, back-crossed three times and then subjected to recurrent selection for three generations, are especially promising. Other investigations include a study of inheritance of resistance to *H. turcicum*, a linkage test involving translocations and a test designed to measure the efficiency of recurrent selection for resistance to *H. turcicum.*

Virginia

Single crosses and back crosses are being selfed in an attempt to isolate lines resistant to *Helminthosporium turcicum*, *H. Maydis*, *Diplodia* and *Gibberella.* Work on high oil and high protein strains is being continued.

Brazil

Most US inbreds do not give good results under conditions in south Brazil; the Indiana line 38–11, however, is promising.

Papers on the following were also presented:—

> *Rogers, J. S. The utilization of male-sterile inbred lines in the production of corn hybrids.* (*pp. 23–25*).

Numerous inbreds have been crossed with the cytoplasmically male sterile line Tx 203Ms at the Texas Agricultural Experiment Station. Most of the resulting single crosses were completely sterile; a few showed partial fertility; three were completely fertile. Sterility has also been investigated in double crosses whose single-cross seed parents each involved a male sterile line. When one inbred capable of restoring fertility has been used in the male single cross, approximately 40% of the double cross plants have been normally fertile. If two inbreds carrying factors for restoration of pollen fertility have been employed, all the plants of the double cross have exhibited fertility. Preliminary results from tests of single crosses indicate that cytoplasmic male sterility has no effect upon yielding ability. Additional work is now in progress to transfer cytoplasmic male sterility to other inbreds used in the production of commercial hybrids, besides Tx 203; large numbers of inbreds are also being surveyed for factors capable of restoring pollen fertility.

> *Josephson, L. M. Reaction of inbreds and hybrids to pre-emergence and post-emergence spraying with* 2,4-D. (*pp. 26–27*).

In 1949 tests were carried out on 19 inbreds used in the production of hybrids certified in

Kentucky. The inbreds showed differences in their responses to both preemergence and postemergence applications of 2,4-D. Tests in 1950 were limited to the inbreds and single crosses comprising the double hybrid Ky 203. No significant differences in emergence were obtained with preemergence spraying. The singles exhibited much more injury than the inbreds when treated at the 8–10 inch stage; the reverse situation was observed with application at the 36 inch stage.

Genter, C. F. Effects of rates of planting on hybrids of different maturities. (pp. 27–30).

Since there is a demand among farmers in Virginia for earlier hybrids, an experiment was carried out at Holland to study the effects of rates of planting on hybrids of different maturities. The results suggest that the possibilities of suitable early hybrids grown at heavy rates of planting should be further explored.

McMurray, S. F. Differential reaction of some southern inbreds to preemergence spraying with 2,4-D, 1950. *(p. 31).*

In a test conducted in Tennessee some inbreds were more sensitive to 2,4-D than others, but only three, T 18, NC 37 and Kys, were injured to any considerable extent.

Richey, F. D. Breeding for niacin content. (p. 32).

Niacin content in starchy maize is determined by multiple factors (cf. *PBA*, Vol. XXII, Abst. 352). Selection has led to strains with a niacin content ranging from 6 to 70 mgrm. per grm. The gene for sugary endosperm interacts with this multiple factor system so that the niacin content is increased by approximarely 60%. Since strains of sweet corn have shown differential effects in modifying niacin content, alleles for sugariness may exist which differ in their influence upon niacin concentration but which cannot be distinguished as regards their effect upon the sugary condition. The gene for sugariness probably affects niacin production by its influence upon the formation of starch from polysaccharides, niacin normally being degraded during starch synthesis. Niacin concentration may therefore be of some value as a selective indicator in breeding sweet corn.

Harvey, P. H. Predicted versus actual yields of double crosses in North Carolina. (pp. 33–35).

An analysis of correlation coefficients between actual and predicted yields of double crosses revealed that, when the error and year x strain interaction variances were removed, the actual values were as good as and in some cases better than the expected maximum values. The data therefore support Jenkins's theory that an almost perfect correlation exists between the mean performance of the four nonparental single crosses and the performance of the corresponding double cross.

Browne, E. B. and Wells, J. C. A comparison of the performance of reciprocal test-crosses between inbred lines and a single-cross hybrid in maize. (pp. 36–38).

Near Athens, Ga., a study was made of the yield, plant height, ear height and 10 other characters of reciprocal crosses between 15 inbred lines and a single-cross tester. A significant difference between reciprocals, based upon the mean difference for all reciprocals, was not obtained for any of the characters scored. Considered individually, the crosses showed reciprocal differences in yield, the differences in some cases being quite large. In 11 out of the 15 crosses, the combination tester ♀ x inbred ♂ gave the higher yield; in the case of individual reciprocal differences in eight characters affecting yield, 62·7% favoured the tester ♀ x inbred ♂ crosses. When relatively small numbers of lines are to be studied, use of the tester as the seed parent therefore seems advisable.

1135 Jenkins, M. T.

Report of the Eleventh Corn Improvement Conference of the North Central Region held at Chicago, Illinois, February 3 and 4, 1950.

Div. Cereal Crops Dis. Bur. Pl. Indust., Soils Agric. Engin., Beltsville, Md. 1950 : Pp. 57. (Mimeographed).

Reports of the committees on the following activities are given: preservation of germ plasm of maize; uniform tests of inbred lines; grouping of inbred lines for breeding purposes; uniform designation of inbred lines; and uniform tests of lines of several different maturities. A panel discussion on cold germination tests is also summarized.

A useful supplement provides lists of: (1) inbred lines of field maize with special breeding value; (2) released inbred lines of field maize, sweet corn and popcorn; (3) inbred lines of field maize used in recommended hybrids; and (4) recommended hybrids with their pedigrees. Each list is conveniently arranged according to state; lists 1 and 3 provide descriptive notes of the inbreds mentioned.

1136 Robert, A. L.
Report of the Twelfth Corn Improvement Conference of the North Central Region held at Purdue University, West Lafayette, Indiana, February 15 and 16, 1951.
Div. Cereal Crops Dis. Bur. Pl. Indust., Soils Agric. Engin., Beltsville, Md. 1951 : Pp. 19. (Mimeographed).

Reports of the various committees are presented (cf. Abst. 1135).

The report of the Hybrid Corn Technical Committee deals with the decision to adopt a uniform regional system of designating new hybrids, and lists experimental hybrids available for regional testing in 1951 and the states interested in testing each group.

Discussions on the policy of release of inbred lines and on cytoplasmic sterility are summarized. Seven experimental stations in the north central region are incorporating cytoplasmic male sterility in their inbreds.

Investigations on resistance to *Helminthosporium* in progress at the Plant Industry Station, Beltsville, Md., are described (cf. Abst. 1134). Cooperative work on the development of corn borer resistant lines is also outlined; this project is centred at Ankeny, Ia., and Toledo, Ohio. In the year under review, emphasis was laid upon ear-to-row tests of S_1 or F_2 cultures originating from synthetic and open-pollinated varieties and from special crosses. In most of the new lines, resistance appears to be derived from the variety Lancaster; Krug and Midland have also yielded promising selections.

A supplement indicates additions to the lists of inbreds of special breeding value, released inbred lines, inbred lines used in recommended hybrids, and recommended hybrids with their pedigrees (cf. Abst. 1135). List 3 includes detailed information on all Wisconsin foundation inbreds, since the previous list referred only to new material.

1137 Le Conte, J.
L'hétérosis et les nouveaux procédés de sélection du maïs aux U.S.A. (**Heterosis and the new methods of maize breeding in the USA**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 121–36.

A review is given of the methods of breeding and selection regarded in the USA as best adapted to ensure high yields, on the assumption that heterosis is due to either (1) interaction of allelomorphs or (2) complementary action of dominant genes from the two parents. Causes of the weakness of pure lines are also discussed (cf. *PBA*, Vol. XX, Abst. 263).

1138 Eckhardt, R. C.
Le maïs hybride aux Etats-Unis. (**Hybrid maize in the United States**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 465–71.

The story of hybrid maize breeding in USA and the utilization of this technique in Canada, Europe, and the Middle and Far East are briefly recorded.

1139 Clapp, A. L. and Tatum, L. A.
Kansas corn tests, 1951.
Bull. Kans. Agric. Exp. Sta. 1952 : No. 352 : Pp. 41.

A detailed summary is given of the results of trials of maize hybrids and varieties in 1951 and previous years.

1140 Rojas, B. A. and Sprague, G. F.
A comparison of variance components in corn yield trials: III. General and specific combining ability and their interaction with locations and years.
Agron. J. 1952 : **44** : 462–66.

Data collected at the Iowa State College from one yield trial with all possible single cross combinations between 11 maize inbreds and a second similar experiment with 10 inbred lines were subjected to detailed analysis. Error variances for the individual trials at different locations were found to be heterogeneous and there was a marked correlation between means and variances. Neither square root nor logarithmic transformations yielded homogeneous error variances; square root transformation, however, eliminated the correlation between means and variances. In both series of trials the specific combining ability ($\sigma^2 s$) was consistently greater than the general combining ability ($\sigma^2 g$). This suggests that interaction between the genotype and the environment may be an important contributory factor influencing the variance of $\sigma^2 s$, since nonadditive deviations due to dominance and epistasis would alone be insufficient to account for the degree of variance observed. Over several years the constancy of $\sigma^2 g$ was maintained. These results indicate that an estimation of $\sigma^2 g$ is more reliable than a prediction based on $\sigma^2 s$, with respect to recurrent selection for a high average yield.

1141 BRACONNIER.
Place des recherches relatives a l'amélioration du maïs dans le programme de l'Institut National de la Recherche Agronomique. (**The place of investigations relating to maize improvement in the research programme of the National Institute of Agricultural Research**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 87–90.

The director of the above institute recommends line selection to obtain well-adapted forms for crossing to produce hybrids suitable for French conditions.

1142 LAUMONT, LABRY and DAUPHIN.
Le maïs et sa culture en Afrique du Nord. (**Maize and its cultivation in north Africa**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 211–43.

In this outline of the past and present position of maize cultivation and selection in Algeria, information on the native types and local varieties is followed by notes on varieties introduced from Italy and the USA (cf. *PBA*, Vol. XXII, Abst. 339). At the Maison Carrée Central Experimental Station, Panmunckey, Jaune L. D. [Yellow L. D.] and their F_1 hybrid have been tested in comparative trials, which have turned out somewhat in favour of Panmunckey.

1143 FENAROLI, L.
La culture du maïs en Italie et les perspectives pour son avenir en rapport avec la diffusion des maïs hybrides. (**Maize cultivation in Italy and its future prospects in relation to the distribution of hybrid maizes**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 413–21.

In this record of the development of hybrid maize production in Italy (cf. *PBA*, Vol. XXII, Absts. 1856 and 2692), the superiority of properly selected hybrids over open-pollinated varieties is made clear.

1144 BECKER.
Quelques aspects de la culture du maïs aux Pays-Bas. (**Some aspects of maize cultivation in the Netherlands**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 423–30.

Trials of American varieties of hybrid maize in the Netherlands have been successful and Dutch breeders are now working on the production of earlier and higher yielding types with a view to extending the range of cultivation into Northern Holland, where mechanical cultivation would be possible on the large farms. Canbred 150 can be grown in that region. Koopman, who bred a very early yellow maize, has about 100 inbred lines undergoing top cross tests and he has also obtained numerous hybrids using Jenkins' method. Bennink, too, has bred many hybrid varieties, including Amo which resembles Wisconsin 240; and Ferwerda is making a study of the behaviour of top crosses.

1145 Le maïs en Indochine. (**Maize in Indochina**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 275–90.

The methods of selection used include Williams's ear to row method, pedigree selection, genealogical selection and Larroque's method (cf. *PBA*, Vol. XVII, Abst. 1074 and Vol. XIX, Absts. 3 and 1994). All methods have given good results, and the following material is undergoing further selection: the white maize M 52; and two red selections, Cambodia and Quarantin. Variety trials of unselected Tonkin white and yellow types, Cambodia, Quarantin and unselected Cambodia have been conducted; experimental trials of various hybrids made in 1926 and 1930 showed the superiority of the hybrids over the parents.

1146 GRILLOT, G.
Le maïs au Maroc et son amélioration. (**Maize in Morocco and its improvement**).
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950): 245–58.

A review is presented of the development of maize culture and maize selection and breeding in Morocco (cf. *PBA*, Vol. XIX, Abst. 1767). Research since 1945 has included: testing of French or foreign varieties and Moroccan populations; experiments on intervarietal hybridization; cultivation trials of foreign hybrids, especially Canadian and American; crossing of pure lines to assess their value as parents; and comparative agricultural studies of successive hybrid generations.

Trials at experimental centres, including the Rabat station, showed the hybrid Microsperma x Cinquantini to be superior to its parents in grain yield.

Work on F_1 generation hybrids, begun in 1949 with seed from the USA, Canada and Australia, indicates that only the F_1 should be used in practice.

1147 Le maïs en Suisse. (**Maize in Switzerland).**
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 437–45.

The suitability of different climatic regions of Switzerland for growing American maize hybrids is discussed. The breeding of hybrids in Switzerland is under consideration.

1148 Tavčar, A.
Les problèmes actuels de la production du maïs en Yougoslavie. (**Topical problems of maize production in Yugoslavia).**
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 447–55.

Since 1946 a study has been made of yields of varieties and populations. The areas of cultivation of the most widely grown varieties of *Zea Mays* vars. *indurata, everta* and *saccharata* are listed.
Parental lines from crosses of the best indigenous varieties have been selected for the production of hybrid maize and 16 different crosses have been made. A special study of the use of 8-rowed varieties for breeding hybrids has been carried out (cf. *PBA*, Vol. XVIII, Abst. 203).
Hybrid seed has proved more resistant than local varieties to *Agriotes lineatus.*
Inbreeding and various genetic combinations are also being investigated.
As an aid to breeders, a table of correlations between the main characteristics of the grain and the rachis is given.
Supplementary pollination has been studied and this procedure is now obligatory on the national and cooperative farms.
Comparative variety trials of regional adaptation in progress include American hybrids received through FAO.

1149 Pirès, D. R. V.
L'amélioration du maïs au Portugal. (**The improvement of maize in Portugal).**
Le Maïs (Maize). Rapp. II Congr. Internat. Maïs Pau, Paris 1949 (1950) : 431–36.

In outlining the methods and prospects of hybrid maize production in Portugal, the author states that adequate hybrid seed of the best adapted varieties will soon be available for Portugal and her neighbours.

1150 La coltura dei mais ibridi in Italia. (**Growing hybrid maize in Italy).**
Agricoltura d. Venezie 1952 : **6** : p. 530.

The hybrids that have done best in the Veneto region in yield and resistance to drought and wind are: the late varieties Embro 155, Indiana 105A, Maygold 99A, Funk's 114 and 141 and Ohio 92; and the early hybrids Wisconsin type 355 x 464 and Funk's 19.

1151 Suto, T.
(**Analysis of variance of the endosperm-embryo ratio and the F_1 grain yield of inbred lines and single crosses in maize).**
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 141–50. [Japanese].

The above characters were analysed in selfed progenies and single cross hybrids of 24 inbred lines derived from American maize varieties. Outcrossing was usually without effect on the P_1 endosperm-embryo ratio; the measurements of the latter, therefore, showed little promise for predictions of heterosis in the F_1.

1152 Palmer, E. D.
Production of maize soars as farmers change to hybrid.
Rhod. Tob. J. 1952 : **4** : No. 10 : 73–74.

Yield increases of 71–77% are reported from Southern Rhodesia owing to the introduction of hybrid maize.

1153 Del Valle, C. G.
La obtención de un híbrido de maíz comercial en Cuba. (**The production of a commercial maize hybrid in Cuba).**
Bol. Estac. Exp. Agron. Cuba 1952 : No. 69 : Pp. 16.

By crossing the best single cross hybrids with a good local variety, yield increases of 63% have been obtained. A double cross formed from a single cross dent x a single cross flint, of the same pedigree as Corneli 11, and named Cuba M 11, has yielded 35% more than the best Cuban flint variety and 25% more than the best dent. It also has a high shelling percentage, has outyielded all other hybrids when tested in Florida and is giving promising results in the South American tropics.

1154 Andres, J. M.
Heterosis en maíces dentados y córneos.
(**Heterosis in dent and flint maize).**
Idia 1952 : No. 54 : p. 16.

In 163 crosses between 30 different inbred lines the dent x flint combinations showed a significant superiority in yield over flint x flint or dent x dent crosses. The use of good dent corns from the USA in crossing with Argentine maize is therefore recommended.

1155 Singleton, W. R., Konzak, C. F. and Matthews, D. L.
Microspore and megaspore mutation rates in maize.
Genetics 1952 : **37** : p. 626. (Abst.).

The observable spontaneous rates of microspore mutation for the genes *Su*, *Sh*, *Wx* and *Pr* determining endosperm characters are apparently 50 to 100 times higher than the accepted rates of less than 10 megaspore mutations per million gametes. The spontaneous rate of megaspore mutation from *R* to *r* is approximately 500 per million gametes; the rate of microspore mutation of this gene is only about 3 to 6 times higher. The following explanation of the apparent discrepancy between megaspore and microspore rates of mutation is suggested. In the megaspore only those mutations will be detected that occur before the first nuclear division. A period of approximately 24 hours lapses between the first meiotic division and the first nuclear division in the megaspore. Any mutation occurring after the latter division would be counteracted by the nonmutant allele in the nucleus at the opposite end of the megaspore. In the microspore, however, all mutations that occur throughout the period prior to fertilization may be detected. The period from meiosis to fertilization lasts about two weeks. Evidence has been obtained that *R* mutates at an earlier stage in microsporogenesis than *Sh*, *Su* or *Pr*; if *R* also mutates at a relatively early stage in megasporogenesis, the higher mutation rate of this gene in the megaspore compared with that of other genes is explicable.

1156 Anderson, R. E. and Brink, R. A.
Kernel pattern in variegated pericarp maize and the frequency of self-colored offspring.
Amer. J. Bot. 1952 : **39** : 637–44.

Analysis of pericarp variegation in plants reared from kernels of maize heterozygous for variegated pericarp and a colourless pericarp allele ($P^{VV}P^{WR}$ or $P^{VV}P^{WW}$) is reported from the University of Wisconsin. The proportion of kernels with self-coloured pericarps, resulting from the mutation of the unstable variegated allele P^{VV} to the stable P^{RR}, for red pigment, is shown to be correlated with the prominence and position of red stripes on the parent kernel. A wide red stripe extending over the region of the embryo results in 50% self-red progeny. The frequency of self-coloured offspring from kernels having a red stripe in any other position may be readily estimated by multiplying the percentage of the circumference under the stripe by 0·6. Transmission of self colour occurs only when the archesporial cell arises in a mutant P^{RR} sector. It is assumed that a mutation occurring early in ontogeny will affect the archesporial tissue regardless of the location of the original mutant cell. Later mutations will not necessarily affect the megaspore. As a result of differential growth, the size of the pigmented area is determined by the position of the mutant sector in the kernel.

1157 Peterson, P. A.
Effect of temperature on the mutation rate of a mutable locus in maize.
Genetics 1952 : **37** : p. 614. (Abst.).

Increases in the rate of mutation from the recessive gene *pg* for pale green seedlings to the dominant gene *Pg* for normal green colour were caused by increased temperature. Using seven uniformly mutating families, at comparable stages of growth, counts were made of green stripes in the first three leaves of seedlings grown at 16° and 29° C. The increase in mutation rate in seedlings raised at 29° C ranged from 2·3 to 17 times the rate in seedlings at 16° C. This considerable range in increased mutation rate is attributed to different genetic backgrounds. Increases in mutation rate were greater in the third leaf than in the second, and greater in the second leaf than in the first. It is suggested that these differences are due to the fact that a greater part of the development of successively younger leaves is affected by temperature.

1158 Wellhausen, E. J., Roberts, L. M., Hernandez X., E. and Mangelsdorf, P. C.
Races of maize in Mexico. Their origin, characteristics and distribution.
Bussey Institution, Harvard University 1952 : Pp. 223.

The most ancient type of maize in Mexico is believed to have been both a pod corn and a popcorn. The chief factors involved in the early evolution of the crop appear to have been relatively frequent mutations, and partial release from the pressure of natural selection through the intervention of man. Influences subsequently important were introgression first by exotic races from the south and later by teosinte. The geography of Mexico, conducive to rapid differentiation of cultivated plants, has also played an important part in the evolution of maize. Twenty-five distinct and well-defined races and four subraces have been recognized as a result of studying a collection of 2000 varieties, with respect to (1) geographical distribution, (2) vegetative characters, (3) characters of the tassel, (4) external and internal characters of the ear, and (5) physiological, genetic and cytological features. The races are divided into four major groups: (1) ancient indigenous races, believed to have arisen from a primitive pod-popcorn type, once widely distributed in Mexico; (2) pre-Columbian exotic races, regarded as having been introduced into Mexico from Central or South America in prehistoric times; (3) the prehistoric Mestizos, consisting of races believed to have originated through hybridization between the first two groups, and through hybridization of each of these groups with teosinte; and (4) modern incipient races, which have apparently arisen since the Conquest and which have not yet reached a state of racial stability. Every race and subrace so far identified is fully described. with a discussion of its particular origin and relationships. Finally, the possible value of the classification in relation to maize breeding in Mexico and the United States is examined.

1159 Brown, W. L., Anderson, E. G. and Tuchawena, R. (Jun.).
Observations on three varieties of Hopi maize.
Amer. J. Bot. 1952 : **39** : 597–609.

Collections of White Flour, Blue Flour and Kokoma maize were made in 1950 from Hotevilla, a Hopi Indian village, where there was little evidence of intervarietal mixing. Although all three varieties have much in common, morphological comparisons show that the characteristics associated with Mexican and Guatemalan maize are combined to a greater extent in White Flour than in the other varieties. Kokoma shows closest relationship, on the basis of comparative morphology, to the prehistoric Basketmaker maize. Blue Flour is intermediate between White Flour and Kokoma. The interrelationship of genes determining pigmentation of the endosperm is discussed. Alleles characteristic of the three varieties are: Blue Flour, $C\ R^{g}\ pl$; White Flour, $C^{I}\ R^{g}\ pl$; and Kokoma, $C\ r^{ch}\ Pl$. Marked differences were noted between the positions of chromosomal knobs in each of the three strains.

1160 Alava, R. O.
Spikelet variation in *Zea Mays* L.
Ann. Mo. Bot. Gdn. 1952 : **39** : 65–96.

An analysis has been made of the variation of (1) spikelet and inflorescence characters in prehistoric tassels collected at Arica, Chile, and at Bat Cave, New Mexico, and (2) spikelet morphology in the tassels of collections of modern maize at the Missouri Botanical Garden. Different strains have been found to have characteristically different degrees of variability. The modern maize of the Papago Indians is morphologically similar to that of the prehistoric Basketmakers at Bat Cave, and is the most variable in spikelet morphology among the varieties of the modern collections. The prehistoric maize from Arica is much more uniform than the highly variable material from Bat Cave, both in glume characters and spikelet arrangement. Multiplication within the inflorescence appears to be present in the maize from Arica, and condensation in the material from Bat Cave. The glumes of Central and North American varieties possess larger and more numerous veins, longer and narrower tips, and stronger keels than those of prehistoric, Oriental and South American varieties. These observations favour the hypothesis of Mangelsdorf and Reeves (cf. *PBA*, Vol. X, Abst. 760) that North and Central American varieties have been extensively modified by introgression from *Tripsacum*.

1161 Schwartz, D.
Evidence for sister-strand crossing over in maize.
Genetics 1952 : **37** : 623–24. (Abst.).

A large ring chromosome involving almost the whole of chromosome 6, the chromosome bearing the nucleolar organizer, was induced by X irradiation of the pollen. Gametophytes possessing the ring, and thus deficient for the chromatin in the terminal regions of chromosome 6, are viable. Crossing-over between the ring and its homologous rod chromosome in the heterozygote produces bridges in both anaphase I and II. Cytologically it is possible to recognize two double cross-over types. A four-strand double exchange results in a double bridge in anaphase I; a three-strand double cross-over (type b), in which a rod chromatid is involved in each exchange, gives rise to a single bridge in both anaphase I and II. The frequency of single bridges in anaphase II was approximately three times the frequency of double bridges at anaphase I. Approximately 50% of the single exchange bivalents, which theoretically should result in single bridges at anaphase I only, also form single bridges in anaphase II. This behaviour can be accounted for by sister-strand crossing-over. A single nonsister cross-over associated with a sister strand cross-over in the ring will give rise to the same anaphase configuration which results from a three-strand double cross-over of type b. The proportions of the four classes of anaphase configurations produced by double nonsister cross-overs are not changed by the occurrence of sister-strand crossing-over. The high frequency of dicentric double ring formation in meiosis also suggests the occurrence of sister-strand crossing-over.

1162 Patterson, E. B.

The use of functional duplicate-deficient gametes in locating genes in maize.

Genetics 1952 : **37** : 612–13. (Abst.).

Preliminary studies of duplicate-deficient types involving the short arm of chromosome 2 show that lg_1 is situated a few chromomeres from the tip and that gl_2 and B are in the distal half of the arm. The gene sk_1 appears to be located proximally at about one-third the distance along the arm. In chromosome 9, C has been found to be situated distally at about one-quarter the total distance along the arm; sh_1 is in close proximity to C. Transmissible duplicate-deficient types involving other chromosome arms have also been investigated. Functioning of duplicate-deficient female gametes is highly variable and is apparently strongly influenced by environmental conditions. No cases of functioning of duplicate-deficient pollen grains have been obtained.

1163 Anderson, E. G.

A chromosomal technique used in biochemical studies on the developing endosperm of maize.

Agron. J. 1952 : **44** : 560–61.

Distinction between grains which will have sugary or starchy endosperms at maturity is now possible at an early stage by means of a translocation linking the genes for sugariness or starchiness with those for endosperm colour, the latter being expressed about 2 weeks after pollination. Translocation 4–6a was chosen as it was very close to Y_1, the gene determining endosperm colour, and showed only 4·5% crossing-over with *su*. Linkage tests with the homozygous translocation have shown that the genes Ts_5, *su*, *Pl* and *sm* are linked in that order with 12·5, 19·5 and 11·4% crossing-over in successive regions.

This translocation technique, using the endosperm as marker at an early stage, can be applied to various other studies, provided that a suitable translocation is available.

1164 Punnett, H. H.

An aberrant fragment chromosome in maize.

Genetics 1952 : **37** : p. 615. (Abst.).

A rod-shaped fragment with an interstitial centromere originated from a telocentric short arm of chromosome 5. The fragment, which includes loci A_2 and Bm_1, has given rise to ring-shaped chromosomes with regular frequency. Rate of ring formation is 8·2% in male gametes, and 1·2% in female gametes. Since the rings may contain either one or both of the two loci, crossing-over is suggested as playing a part in their origin; the sex difference in rate of ring formation may reflect the difference in cross-over values for male and female gametes known to occur for this region of the normal chromosome 5.

1165 Chase, S. S.

Selection for parthenogenesis and monoploid fertility in maize.

Genetics 1952 : **37** : 573–74. (Abst.).

Data from six single crosses involving four autodiploids, derived from monoploids, and from double hybrids between these single crosses indicate that further use of stocks obtained from monoploids is a promising method of developing homozygous lines (cf. *PBA*, Vol. XXII, Abst. 2669). The dent maize Stiff Stalk Synthetic, the original stock from which the parental autodiploids were derived, yielded monoploids at the rate of 1·3 per 1000 seedlings in genetically marked progenies; 9·4% of these monoploids set selfed seed. The group of single crosses produced monoploids at the rate of 4·3 per 1000 seedlings; selfed seed was produced by 33%. In the group of double crosses, monoploids arose at the rate of 2·9 per 1000; 30·5% were self fertile.

1166 Ford, L.

A cytogenetic study of a set of maize monoploid twins.

Genetics 1952 : **37** : p. 580. (Abst.).

Meiosis was studied in a set of monoploid twin plants. Restitution nuclei and despiralization of the chromosomes in telophase I were observed. Counts in the second division revealed regular chromatid reduction. Occasional giant cells were found in one twin plant. They were probably caused by the tendency to fusion shown by some cells, accompanied by disintegration of the walls and chromatin. Bridges plus fragments were visible at anaphase I.

1167 GABELMAN, W. H.
Genetic control of the cytoplasmic factor for male-sterility in maize.
Genetics 1952 : **37** : 582–83. (Abst.).

The inbred Minnesota A 34 possesses a single dominant gene capable of introducing partial fertility into cytoplasmically male-sterile inbreds and hybrids. When crossed with this inbred, they produce only 40% aborted pollen, and appear to be normal as regards anthesis and general characters. F_2 data have indicated the presence of modifiers.

1168 TEAS, H. J.
A morphological basis for higher niacin in sugary maize.
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 817–22.

TEAS, H. J. and ANDERSON, E. G.
Niacin in starchy and sugary maize.
Genetics 1952 : **37** : p. 632. (Abst.).

Examination of the aleurone layer of maize kernels with sugary (su_1) and starchy (Su_1) endosperms has revealed that kernels with an su_1 genotype have a much thicker aleurone layer than starchy kernels. Since 60–70% of the niacin of the kernel is restricted to the aleurone, the correlation between the niacin content and the su_1 allele therefore has a morphological basis.

1169 **Corn inbred makes outstanding record.**
Seed World 1952 : **71** : No. **4** : p. 18.

Conn. 103 and five other inbred lines of maize are being used in breeding at the Connecticut Agricultural Experiment Station, on account of their high sugar content, strong stalks and resistance to diseases and insects. The hybrid Conn. 845, involving four of these inbreds, is already in commercial cultivation as a grain-ensilage type.

1170 DUVICK, D. N.
Free amino acids in the developing endosperm of maize.
Amer. J. Bot. 1952 : **39** : 656–61.

The amount, relative proportions and changes in proportions of free aminoacids and amides in four morphologically dissimilar maize varieties were shown to be similar among all the varieties, using the paper partition chromatographic technique.

1171 BRINK, R. A. and NILAN, R. A.
The relation between light variegated and medium variegated pericarp in maize.
Genetics 1952 : **37** : 519–544.

Data from investigations on the inheritance of two unstable pericarp phenotypes, light and medium variegated, and of the stable self-coloured phenotype have led to the following hypothesis. The unstable allele P^{VV} for variegation is a modified form of the stable gene P^{RR}, the difference between them being that P^{VV} embodies a discrete element, designated modulator (*Mp*), which inhibits pigment formation. Thus mutation of P^{VV} to P^{RR} for self-coloured pericarp consists of loss of *Mp* from locus *P*. Subsequent to its removal from the locus *P*, *Mp* may become established elsewhere in the chromosome complement. When reduplicated in a position other than locus *P*, and in combination with P^{VV}, the light variegated phenotype is produced. The medium variegated phenotype is without *Mp*, but has the capacity to generate it, since a few of the offspring of this phenotype have light variegated pericarp. The modulator cannot be explained in conventional genetical terms, as regards either its origin or mode of transmission. The relatively few light variegated and self-coloured offspring of the medium variegated phenotype are regarded as the result of new somatic mutational events involving *P* and *Mp*. It is suggested that the pericarp phenotypes of families from the light variegated class are conditioned by the segregation of *Mp* as a stable unit separate from locus *P*, and possibly also by new somatic mutations of *Mp*. The varying proportions of light and medium variegated offspring from the light variegated phenotype are interpreted in terms of linkage or independence of *Mp* relative to the locus *P*.

1172 JONES, M. D. and BROOKS, J. S.
Effect of tree barriers on outcrossing in corn.
Tech. Bull. Okla. Agric. Exp. Sta. 1952 : No. T–45 : Pp. 11.

An experiment was carried out near Stillwater, Okla., for three seasons to determine the effect of a tree barrier upon the purity of sweet corn seed. The tree barrier separated the field of sweet corn from a field of the dent maize Yellow

Surcropper. The barrier was effective in reducing outcrossing on the first 10 rows to 50% of that occurring in an area equally distant from the contaminating field but without a barrier; at greater distances it was however less effective. The barrier reduced outcrossing to amounts similar to those obtained with 15 rods distance in the absence of a barrier, but was not as effective as a planting of border rows occupying an area equal to that taken up by the tree barrier.

1173 **Three Nebraska corn hybrids will be available next year.**
Crops & Soils 1952 : **5** : No. 1 : p. 26.

Three new hybrids developed at the Nebraska Agricultural Experiment Station have been released for local planting in 1953. Two of the hybrids, Nebraska 401 and Nebraska 402, mature in 106–110 days and are superior to Iowa 4316 in respect of lodging resistance and yielding ability; both are moderately tolerant of corn borers. Nebraska 402 is especially resistant to ear dropping. The third hybrid, Nebraska 505W, is a white-grained type suitable for central and northwestern Nebraska, where it matures earlier than other white hybrids, in 110–114 days. It outyields yellow hybrids of the series 500 but lodges more readily.

1174 Kišpatić, J. and Lušin, V.
Prašna snijet kukuruza. (**Head smut of maize**).
Zaštita Bilja (Plant Protection), Beograd 1952 : No. 12 : 18–29.

Investigations of the biology of *Sorosporium Reilianum* at Zagreb included infection trials of many varieties and hybrids. Some evidence suggesting that the maizes of the Osmak type carry a higher degree of resistance to the disease than material derived from Zuban [Dent] and Hrvatica [Croatian] is presented.

1175 Reilly, J. J.
Correlation of seedling blight to stalk rot and nature of seedling resistance to *Diplodia zeae*.
Phytopathology 1952 : **42** : p. 473. (Abst.).

The amounts of seedling blight and stalk rot due to *D. Zeae* in different maize hybrids were significantly correlated for each individual race of the fungus. Resistance was associated with high concentration of sugars in the roots of three-weeks-old seedlings, as shown by paper partition chromatography analyses, and with the ability of the seedlings to produce secondary roots.

1176 Taylor, G. S.
Nutritive value of cornstalk juice inversely related to stalk rot resistance.
Phytopathology 1952 : **42** : p. 476. (Abst.).

No evidence was obtained that reaction to *Diplodia Zeae* in maize inbreds depends upon the nutritive value of the stalk juice.

1177 **New hybrid corn shows promise of reducing bird damage.**
Fm Home Res. 1952 : **37** : 87, 96.

An early maturing hybrid with long tough husks which render it resistant to bird attack is being developed in Ohio.

1178 Andersson, G. and Lööf, B.
Redogörelse för försöks- och förädlingsarbeten med majs vid Sveriges Utsädesförening. (**Report on variety trials and breeding work with maize at the Swedish Seed Association**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 323–45.

Trials in progress in Sweden to compare the silage value of early and late ripening European varieties and American hybrids from Madison, USA, are summarized in tabular form. The early ripening variety Eagle Hill of very good silage quality and the late yielding hybrid W 464 have been deemed suitable for growing in Sweden.

The breeding programme includes testing of American inbred lines, hybridization of the best adapted and most productive under Swedish conditions and comparative trials of the best combinations.

BARLEY

1179 Caldecott, R. S., Frolik, E. F. and Morris, R.
A comparison of the effects of X-rays and thermal neutrons on dormant seeds of barley.
Proc. Nat. Acad. Sci., Wash. 1952 : **38** : 804–09.

Seeds of Himalaya barley were subjected to X irradiation by 5000–20,000 r. and thermal neutron irradiation for 3–12 hrs. at 4·65 x 10^8 N_{th}/cm.^{2}/sec. at the Brookhaven National Laboratory, USA. Seedlings grown from X-irradiated seed showed a wide range of height 14 days after germination. Those subjected to 20,000 r. varied from 1 to 18 cm. in height, whereas controls and seedlings resulting from thermal neutron irradiation showed little difference in height, averaging 17·7 cm. Some 40 days after planting, all seedlings treated with the highest thermal neutron dosage were dead, while the rest appeared healthy; on the other hand, differential lethal effects were observed in X-irradiated seedlings subjected to 1000, 15,000 and 20,000 r. The types of chromosomal aberrations caused by both forms of radiation were similar, but the highest X ray dosage gave an aberration frequency equal to that resulting from treatment with thermal neutrons for only 3 hrs. Thus it is concluded that aberrations caused by thermal neutrons have less effect on the phenotype than those caused by X rays.

1180 **Proctor spring malting barley.**
NIAB, Cambridge 1952 : Pp. 4.

Proctor was developed at the Plant Breeding Institute, Cambridge, from a cross between Kenia and Plumage-Archer. It is higher yielding than either parent and Spratt-Archer, and is superior to Kenia in grain quality, having a lower nitrogen content, higher extract and better appearance; in many trials its quality has been equivalent to that of Spratt-Archer, and in some cases superior. It has shorter and better standing straw than Spratt-Archer or Plumage-Archer. It ripens 4–5 days earlier than Spratt-Archer and 3–4 days later than Kenia, and has exhibited greater resistance to loose smut and mildew than Kenia.

1181 AUFHAMMER, G.
Entwicklungen im Braugerstenanbau Bayerns. (**Development of malting barley cultivation in Bavaria**).
Z. Ges. Brauw. 1952 : **48** : 1169–72.

Barley growing has extended in Bavaria, partly owing to the improved yields, which have risen by nearly 90% since the year 1880. Breeding work has accounted for part of this increase and has led also to improvements in grain, husk percentage, uniformity in corn quality and germination, mildew resistance and grain : straw ratio.

The number of varieties on the market has been reduced from 215 in 1930 to 25 in 1950, almost all of them being descendants or relatives of Ackermann's Isaria.

1182 ULONSKA, E.
50 Jahre Bayerische Landessaatzuchtanstalt Weihenstephan. (**50 years of work of the Bavarian State Seed Breeding Station, Weihenstephan**).
Z. Ges. Brauw. 1952 : **48** : 1173–76.

The development of this German plant breeding institute since its foundation in 1902 is outlined, with particular reference to barley breeding. The institute supplied the hybrid material for breeding Ackermann's Isaria, a series of spring barleys resistant to mildew races A and D, and Lichti's Astra resistant also to race B; hybrids combining mildew resistance, brown rust, high yield and satisfactory quality are under observation.

1183 **Kenbar winter barley.**
Seed World 1952 : **71** : No. **5** : 8, 47.

Kenbar is an early maturing, bearded, six-rowed variety with strong straw, short heads and high yielding capacity. It is resistant to loose smut, mildew and leaf scald; its moderate susceptibility to leaf rust is partly counteracted by its early maturity. Kenbar was developed from a composite cross involving 18 varieties, and is recommended for Kentucky and Pennsylvania.

1184 **Missouri B-400 barley.**
Seed World 1952 : **71** : No. **4** : p. 18.

The winter barley Miss. B–400 has the advantages of early maturity, disease resistance, strong straw, and high yield of grain. It is fully winter hardy in southern and central Missouri, and especially suitable for autumn pasture.

1185 WILTEN, W.
Verslag van een tweede bezoek aan de veredelingsbedrijven van zomergerst in Scandinavië in 1950. (**Report on a second visit to the breeding centres of spring barley in Scandinavia in 1950**).
16de Nacobrouw Jb. 1952 : 50–54.

Notes are recorded on barley breeding in progress at various establishments in Denmark and Sweden, including the Abed and Weibullsholm stations, whose work is regularly reviewed in *Plant Breeding Abstracts* (cf. Vol. XXII, Absts. 1753, 1707 and 1907).

1186 TAKAHASHI, R.
(**Inheritance of spring or winter habit in barley**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 196. [Japanese]. (Abst.).

Two lines have been isolated from the variety Iwate Menshuari 2, the first (A_1) being a winter form, while the second (c) was a light-sensitive alternative barley. The gene for light sensitivity (l_s) is linked with h_s (hairy leaf sheaths), the cross-over value being 6·4%.

The F_2 of the cross between the spring barley Kadaikon and the autumn variety Shimahara was reared under high temperatures and continuous illumination. Under these conditions spring and autumn types segregated in a ratio of 13 : 3, suggesting that earliness depends on two independent genes *A* and *b*. The relations of these two genes to those discussed earlier are considered.

1187 Nikitenko, G. F.
(A new method of intravarietal hybridization of barley).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 36–43. [Russian].

Intravarietal hybridization of two-rowed barley, including some hybrids and inbreds and the local standard Kazanj 6/4, at the Mordva State Breeding Station is reported. The material comprised seed of various origins or harvested in different years and was grown under varied conditions. A modified method of emasculation leaving lateral spikelets intact was used, besides the normal method involving their removal.

Agrobiological analysis of the F_1 of Kazanj 6/4 showed that the material obtained by the new method had taller straw, bore more productive tillers and longer ears and yielded more grains per ear than the plants obtained by the normal technique. Some plants had higher 1000 seed weights, besides being more productive.

1188 Wilten, W.
Een reis naar Engeland in 1951. **(A visit to England in 1951).**
16de Nacobrouw Jb. 1952 : 55–59.

The possibility of estimating the value of a malting barley by determining the activity of the starch and protein splitting enzymes, as suggested by E. Sandegren at the Congress of the European Brewery Convention is mentioned. The barley trials at Guinness's Barley Research Station at Warminster included some promising lines bred by Hunter and by Bell.

1189 Moh, C. C. and Smith, L.
Three coincidental changes in atom-bombed barley.
J. Hered. 1952 : **43** : 183–88.

A mutant line, which on selfing gave 50% white seedlings and 50% green plants which were heterozygous for both a reciprocal translocation and a mutant gene for white seedlings, was obtained from Trebi seed exposed to atomic radiation at Bikini (cf. *PBA*, Vol. XXI, Abst. 177). Meiotic configurations of the green mutants, which were all partially sterile, showed a ring of 4 chromosomes plus 5 bivalents. When the mutants were used as male parents in crosses with Compana, F_1 hybrids had 7 bivalents like normal barley and were fully fertile; they proved to be heterozygous for the gene for white seedlings, producing 20% of white seedlings in the F_2. In the reciprocal cross 50% of the F_1 had a ring of 4 chromosomes but did not carry the gene for white seedlings; the rest had 7 bivalents and produced some white seedlings in the F_2.

It is assumed that the atomic radiation induced three coincident mutations: (1) a mutant gene, *W*, for white seedlings in a noninterchanged chromosome; (2) a chromosomal interchange between two homologous chromosomes; and (3) a gene, *Y*, at the point of interchange, transmissible through ♀ gametes but not through pollen. Since no cross-over was found between the three mutations, it is possible that they may be interrelated, occurring perhaps at the same locus.

As every survivor carries an interchange, this mutant line is recommended for teaching purposes.

1190 Nikitenko, G. F.
(A study of some phylogenetic questions concerning cultivated barleys, *Hordeum sativum* Jess., by the method of directed experiment).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **78** : 783–86. [Russian].

Mičurinite experiments with barley at the Mordva State Breeding Station have removed the principal theoretical objection to the monophyletic origin of cultivated barleys. It is claimed that *H. vulgare* types may evolve from *H. distichum* after treatment with short photoperiods and growing upon rich soil. Some forms intermediate between the multi-rowed and two-rowed barleys have been obtained by this method from *H. distichum*.

The experimental material included some intervarietal vegetative hybrids and the F_1, F_3 and F_4 of Viner x Zolotoĭ [Golden], Viner x Lebedinaja Šeja [Swan Neck], Viner x Deviz [Motto], Viner x var. *erectum* 1010/136 and Viner x var. *nudum* 1069.

1191 Nishimura, Y., Niizeki, H. and Saito, T.
(X-ray-induced mutants in barley).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 193. [Japanese]. (Abst.).

Partial sterility associated with the formation of multiple associations is described in the progeny of an X-irradiated barley sample.

1192 YAMAMOTO, K.
(Investigations on viviparous germination in barley).
Nogaku Kenkyusho Iho (Bull. Inst. Agric. Res.) 1949 : **1** : 13–18. [Japanese].

An investigation into germination in the ear in Japanese varieties showed that 14 groups could be distinguished on the basis of percentage vivipary and the time elapsing before germination commenced. Certain of these groups were characteristic of specific regions in Japan. Varietal differences were also noted in the extent to which germination was accelerated by H_2O_2. The F_1 of the cross between the pronouncedly viviparous variety Atarashi 1 [New 1] and the slow-germinating variety Aizu 6 was intermediate between the parents in degree of vivipary. (cf. Abst. 330).

1193 SUNESON, C. A., SCHALLER, C. W. and EVERSON, E. H.
An association affecting yield in barley.
Agron. J. 1952 : **44** : 584–86.

The segment of chromosome V in Lion barley, between and adjacent to the alleles conditioning awn barbing (*Rr*) and rachilla hair length (*Ss*), has been transferred to Atlas by back-crossing at the University of California. Three different composite stocks were developed having the genotypes *rrSS*, *RRSS* and *rrss*; thus, in conjunction with Atlas (*RRss*), four combinations were available for testing in a common genetic background. The composites *rrSS* and *rrss*, differing from Atlas in their semismooth awns, showed significant yield increases ranging from 0·6 to 32·5 bushels per acre over a period of six years; but yields of composite *RRSS*, which differs from Atlas in rachilla hair length only, were not larger than those of Atlas. The *Ss* locus does not therefore appear to contribute to yield differences. Whether yield superiority results from a pleiotropic effect of *rr*, contributed by Lion, or from other closely linked genes is not yet known.

1194 **Industrial evaluation of three varieties of barley grown in 1950 and annual report 1950-51.**
Publ. Malt Res. Inst., Madison 1952 : No. 11 : Pp. 22.

In addition to further data on the malting and brewing properties of Kindred, Montcalm and Moore (cf. *PBA*, Vol. XXI, Abst. 2660), the report contains information on the work of the Malt Research Institute including: evaluation of seedling selections, from all state and federal breeding programmes, at the Barley and Malt Laboratory, Madison, Wis.; and hybridization between Kindred and Titan at the North Dakota Agricultural Experiment Station (cf. *PBA*, Vol. XXII, Abst. 1174).

1195 COVAS, G.
Nota taxonómica sobre especies sudamericanas de "Hordeum." (**Taxonomic note on South American species of *Hordeum***).
Rev. Argent. Agron. 1952 : **19** : 140–42.

A number of species are indicated as being synonymous with *H. comosum* or other previously established species. *H. Valdiviae* is put back into the genus *Elymus*.

1196 KOOI, I. and NIJDAM, F. E.
Het onderscheid tussen Kenia en Balder zomergerst bepaald aan de korrel. (**The difference between Kenia and Balder spring barley as determined from the grain**).
16de Nacobrouw Jb. 1952 : 37–42.

Balder differs from the other 2-rowed spring barleys in the Netherlands collection by the absence of red pigment, a varietal characteristic specially noticeable in the dorsal glume. Distinctive glume and grain characters of other varieties, e.g. Kenia and Saxonia, are mentioned.

1197 WILTEN, W.
Opbrengsten, rassenstatistiek en raseigenschappen van zomergerst. (**Yields, statistics of varieties, and varietal characters of spring barley**).
16de Nacobrouw Jb. 1952 : 69–81.

The yields and distribution of leading varieties in Holland are set out and a comparative table shows the varietal characteristics of some of the main Swedish and other varieties grown in Holland. Breusted 1038/45, a multi-rowed fodder barley, gave the best yields. Heine 505 also did well but has weak straw.

1198 VOVČENKO, I. V.
(Winter barley in the Odessa province).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : p. 79. [Russian].

Pallidum–17, a productive and hardy winter barley developed at the Odessa Institute, was tolerant of − 26° C in trials conducted at the institute in 1949–1950.

1199 SKOROPAD, W. P. and JOHNSON, L. P. V.
Inheritance of resistance to *Ustilago nuda* in barley.
Canad. J. Bot. 1952 : **30** : 525–36.

Data concerning resistance to two races of *U. nuda*, known as Tr and Ts, have been obtained at Edmonton, Alta., using F_1, F_2, F_3 and back cross progenies from various combinations of Jet, Montcalm, Sanalta and Titan. The resistance of the latter to Tr was found to be due to a single dominant gene, presumably the same as that (*Un*) which governs resistance in the closely related variety Trebi (cf. *PBA*, Vol. XVII, Abst. 1646). Un_3, determining the resistance of Jet to Tr, has already been identified (cf. *PBA*, Vol. XX, Abst. 954). The resistance of Jet to Ts was also found to depend on a single dominant gene, which has been provisionally designated Un_6. There is, however, no definite proof that three distinct genes are involved, since interaction between two genes may produce the action attributed to the third.

1200 Eikeland, H. J.
Byggsortforsøk. (**Barley variety trials**).
Bondevennen 1952 : **55** : 113–20.

The yield and quality of 2-rowed and 6-rowed Scandinavian barleys in trials at Forus experiment station in Norway are recorded. Jadar II still remains unsurpassed among the 6-rowed varieties tested, though some promising lines still undergoing selection may prove possible rivals. The 2-rowed Domen is recommended as the stiffest strawed Norwegian variety, but its yield is slightly inferior to that of Maja, Herta and Ymer.

1201 Wilten, W.
De veldproeven in 1951. (**The field trials in 1951**).
16de Nacobrouw Jb. 1952 : 64–68.

The spring barley Balder, used as the standard in these Dutch trials in various districts, was outyielded by few varieties. Heine 505 was among the highest yielding. Rika, Herta, Breusted 1038/45 and Agio were classed as stiff-strawed. The German varieties showed high field resistance to mildew.

MILLETS AND SORGHUMS

1202 Corriols, J.
Quelques observations sur la biologie florale du mil et du sorgho au Sénégal. (**Some observations on the floral biology of millet and sorghum in Senegal**).
Ann. Centre Rech. Agron. Bambey 1950 : 59–69.

The systematic classification of the species of the cultivated forms of *Pennisetum* and *Sorghum* and their botanical features and floral biology are discussed, with illustrations of the floral organs as well as tables showing the various stages of the flowering process, as observed at the Bambey Research Centre in 1950. Unfortunately observation of hybrid and other species of *Pennisetum* was hampered by violent winds and the collection of records was to be completed later.

Warning is given regarding the confusing terminology in use in Senegal to designate early, late, awned and unawned types.

1203 Kuzjmin, P. K.
(***Panicum glaucum*, *P. Crus-galli* and *Setaria viridis* plants originating from millet**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 40–41. [Russian].

A panicle of a single millet individual, found in a field in the Mordva ASSR, bore seeds of *P. glaucum*, *P. Crus-galli* and *S. viridis*. The seed developed into normal plants of these species when grown under laboratory conditions.

1204 Divakaran, K. and Krishna Rao, P.
Reniform grain shape in ragi—*Eleusine coracana* (Gaertn).
Madras Agric. J. 1952 : **39** : 524–25.

Reniform grains have been found among seed samples of *E. coracana* studied at the Agricultural College and Research Institute, Coimbatore. This type is slightly but significantly heavier than the normal globular grain. Reniform grains appear to be restricted to African samples. Pure lines of the reniform type are now being isolated, to study the inheritance of this form of grain.

1205 Mansfeld, R.
Zur Systematik und Nomenklatur der Hirsen. (**Systematics and nomenclature of the millets**).
Züchter 1952 : **22** : 304–15.

Taxonomic descriptions are given of the genera *Eragrostis*, *Eleusine*, *Panicum*, *Echinochloa*, *Digitaria*, *Paspalum*, *Setaria*, *Pennisetum* and *Sorghum*, with indications of the species cultivated, their local names, modes of usage, and distribution.

1206 **Periamanjal Irungu—a new economic variety of sorghum.**
Madras Agric. J. 1952 : **39** : p. 531.

The yellow-grained sorghum variety Periamanjal Irungu has given higher yields of grain and fodder than the local type in certain districts in Madras. It was developed from a cross between local Irungu from the southern tract and Periamanjal from the Coimbatore district.

1207 Ponnaiya, B. W. X.
Studies in the genus *Sorghum*: II. The cause of resistance in *Sorghum* to the insect pest *Atherigona indica* M.
J. Madras Univ. 1951 : **21** : Sect. B : 203–17.

Resistance to *A. indica* (cf. *PBA*, Vol. XXII, Abst. 1937) depends upon the early formation of irregularly shaped silica deposits in the epidermis of the leaf sheath. In resistant varieties the deposits are abundant in the sheaths of the fourth and subsequent leaves; in susceptible varieties they only begin to appear in the sheath of the sixth leaf. Lignification bears no relationship to resistance, nor does the presence of dumb-bell shaped silica units in the epidermis.

1208 Cotte, A.
Expérimentation sur les sorghos, 1948–1951. (**Experiments on sorghum, 1948-51**).
Bull. Tech. Ing. Serv. Agric. 1952 : No. 71 : 417–24.

At the National Agricultural College, Montpellier, trials of varieties of grain sorghums, sweet sorghums and Sudan grass from South Africa, India, Canada, the USA, Brazil, Uruguay, Italy and the French dependencies in Africa have been carried out to determine the value of the three types of sorghum for French agriculture. The main characteristics under observation were earliness, yield, resistance to lodging and drought, and suitability for combine harvesting (cf. *PBA*, Vol. XX, Abst. 1655, Vol. XXI, Abst. 345 and Vol. XXII, Abst. 407).

RICE

1209 Ramiah, K., Ghose, R. L. M. and Vachhani, M. V.
Improvement of rice in India.
Emp. J. Exp. Agric. 1952 : **20** : 161–74.

The survey includes an account of the achievements and problems of rice breeding in India, with reference to the following: high yielding ability; natural hybridization between wild and cultivated rice; earliness; interracial crossing; resistance to submergence and salinity; resistance to blast and insect pests; quality; the possible value of secondary selection; breeding for different levels of soil fertility; use of the discriminant function in improving yield; and genetics.

1210 **Paddy research in Ceylon.**
Trop. Agriculturist 1952 : **108** : 1–3.

A brief review is given of the achievements of rice research during the present century.

1211 Adair, C. R. and Cralley, E. M.
Rice breeding and disease control studies in Arkansas, 1940 to 1950.
Bull. Ark. Agric. Exp. Sta. 1952 : No. 525 : Pp. 23.

A detailed survey is presented of breeding carried out to develop early and mid-season varieties of the short, medium and long-grained types, with wide adaptability, resistance to diseases, resistance to lodging and shattering, suitability for combining and drying, high yields in the field and when milled, and good table quality. Some of these objectives have been achieved in the varieties Zenith, Arkansas Fortuna, Arkrose, Kamrose, Prelude and Rexark. Information is given on the reactions of varieties and hybrid selections to white tip (*Aphelenchoides oryzae*), narrow brown leaf spot (*Cercospora Oryzae*) and brown leaf spot (*Helminthosporium Oryzae*). The results of trials of 10 glutinous varieties are also reported.

1212 Capinpin, J. M. and Rola, G. A.
A genetic study of variegation in rice.
Philipp. Agric. 1951 : **35** : 196–201.

A variegated mutant having yellow and green stripes has been successfully maintained by vegetative clonal propagation for several years at the College of Agriculture, Laguna, Philippines. In each of three successive generations of selfing, the progeny comprised normal green and yellowish white seedlings in proportions corresponding closely with the 63 : 1 ratio expected from trigenic segregation. The variegated mutant form was not recovered. Since the yellowish white segregates failed to mature, it is suggested that they were homozygous for three recessive genes which proved lethal.

1213 Morinaga, T. and Kuriyama, H.
(**Triploid rice plants obtained by crossing diploid and tetraploid strains**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 200. [Japanese]. (Abst.).

Data are provided on the number of viable grains obtained by hot water emasculation of diploid rice strains followed by the application of pollen from tetraploid strains after various intervals of time.

1214 Majima, I. and Uchiyamada, H.
(Studies on the breeding of highly fertile tetraploid rice).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 197–98. [Japanese]. (Abst.).

Colchicine-induced tetraploid lines of selfed varieties and of intervarietal hybrids have been obtained. Fertility was variable with a maximum of 99%. In general, the derivatives of the selfed varieties were less fertile than the derivatives of the hybrids, and the latter varied in fertility according to the type of combination involved.

1215 Masima, I.
(A consideration of the causes of sterility in tetraploid rice).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 179–88. [Japanese].

The cause of the reduced fertility of a tetraploid strain of rice was analysed into 15–20% gametic sterility, 15% environmental disturbance, and 50% zygotic sterility. Meiosis in the tetraploid was characterized by the presence of univalents and multiple associations, and subsequent irregularities in chromosome segregation. Selection for fertility over a three year's period was ineffective.

1216 Kuriyama, H. and Watanabe, Y.
(Ecological studies of diploid and autotetraploid rice plants).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 156–60. [Japanese].

Diploid and colchicine-induced tetraploid strains of six rice varieties were compared under various environmental conditions. In final plant height, the diploids were superior. As regards date of heading, some tetraploids were later and others earlier than the corresponding diploids. The diploid and tetraploid strains of a Philippine variety differed markedly in reaction to different photoperiods.

1217 Chandraratna, M. F.
Photoperiod effects on the flowering of tropical rices.
Trop. Agriculturist 1952 : **108** : 4–10.

At the Bathalagoda Rice Research Station, Ceylon, varieties from India, Indonesia and Burma and 12 indigenous strains were exposed to a daily photoperiod of 9 hours, commencing 21 days after sowing. The period between germination and panicle emergence was shortened in all varieties except A 64 from Bombay and the indigenous Heenati, both of which require a much longer optimum photoperiod for inflorescence production.

Many indigenous strains showing early maturity under the normal day conditions of Ceylon flowered 25–34 days earlier when a 9 hour photoperiod was experienced, whereas the late varieties Panduruwi and Kohumawi flowered 55 and 57 days earlier respectively. Two Burmese rices, MYAC 104 and HMC 30, proved most sensitive to the short photoperiod and headed 108 and 102 days sooner. The awnless (tjereh) varieties from Indonesia flowered 32–39 days earlier, but flowering was only advanced by 8 days in the awned (bulu) rices, which are well adapted to areas with photoperiods exceeding 11 hours.

Curves relating the photoperiod to the interval between germination and flowering are constructed for five varieties, and their use for estimating varietal sensitivity and optimum photoperiod is explained.

1218 Jagoe, R. B.
Photoperiodism of *Oryza sativa* in Malaya. Experiments on the effects of a small difference of light period on flowering of the padi plant.
Malay. Agric. J. 1952 : **35** : 85–102.

At Kuala Lumpur, where 12 hours daylight are normally experienced, three local varieties, Reyong 20, Siam 29 and Seraup 48, generally produce ears within 100 days of transplanting. Inflorescence production was, however, inhibited by daily exposure to a total photoperiod of 12 hrs. 50 mins. Some time after the control plants had flowered the 50 mins. of extra illumination were discontinued; within three weeks all three varieties had begun to flower.

1219 Abeyratne, E.
A preliminary note on an unrecorded group of paddy varieties occurring in Ceylon.
Trop. Agriculturist 1952 : **108** : 21–28.

Since it was noted that the Heenati variety of rice gave an unusual response during photoperiodic experiments, in comparison with other indigenous rices grown in Ceylon (cf. Abst. 1217), numerous additional physiological and morphological characteristics differentiating races or strains of Heenati from other varieties have been observed. The distinctive characteristics of the group are outlined.

1220 Luong Dinh Cua.
(Tetraploid intersubspecific hybrids between Japanese and Indian rice).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 194. [Japanese]. (Abst.).

Tetraploid strains of hybrids between vars. *japonica* and *indica* of *Oryza sativa* are much more fertile than the corresponding diploids.

1221 LUONG DINH CUA.

Artificial polyploidy in the Oryzeae. IV. A tetraploid hybrid from the cross "diploid x autotetraploid" in rice, *Oryza sativa* L.

Cytologia, Tokyo 1952 : **17** : 183–90.

One of the few viable hybrids otained from a cross between the diploid variety Konanto (♀) and its colchicine-induced autotetraploid form (cf. *PBA*, Vol. XXII, Abst. 1185) proved to be a tetraploid, morphologically similar to the pollen parent, apart from purple pigmentation of the awns, which are colourless in the autotetraploid. The hybrid matured one month later than the latter, and was completely male sterile. Cytological observations at microsporogenesis indicated that all 48 chromosomes became univalents at metaphase I; although sometimes two chromosomes showed mutual attraction, they were unable to pair properly. Random distribution of univalents occurred at anaphase.

It is considered that the hybrid arose by fusion of a reduced male gamete and an unreduced diploid egg cell. Failure of chromosome pairing is attributed to gametic gene mutations caused by unfavourable external conditions prevailing at the unusually late time of heading.

1222 STURGIS, F. E., MIEARS, R. J. and WALKER, R. K.

Protein in rice as influenced by variety and fertilizer levels.

Tech. Bull. La Agric. Exp. Sta. 1952 : No. 466 : Pp. 27.

Data are presented showing the wide variation in total protein content (6·44–9·44%) and distribution of the five solubility fractions in 29 varieties and selections grown at the Rice Experiment Station, Crowley, La. Rexoro and Blue Rose 41 have very high protein content; hybrids resulting from the combination of both varieties inherit this characteristic, but hybrids derived from either Rexoro or Blue Rose 41 do not necessarily have a high protein content. It is, however, obvious that a complex mode of inheritance influences the protein content more than cultural conditions.

1223 NAGAO, S. and TAKAHASHI, M.

(**Studies on the hybridization of rice. XV. On the genotype, with regard to glume colour, of the glutinous rice variety Karasu**).

Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 196. [Japanese]. (Abst.).

A study of the progeny of the cross between the dark purple glutinous variety Karasu [Crow] and Shinryoku [Divine Power] indicates the presence in the former of the chromogenes B, R, S, C^B, Sp and Rp.

1224 SHAKUDO, K., TOMINAGA, M., KAWASE, T. and HAYASHI, K.

(**On the quantitative effect of two genes controlling panicle length and one dwarf gene in rice. Studies on quantitative inheritance. VIII**).

Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 193. [Japanese]. (Abst.).

The effect on panicle length of the two gene pairs P_4p_4 and P_5p_5, which govern panicle length, and D_1d_1, which controls plant stature, was analysed in the F_1–F_5 of the cross Nabeshima ($P_4P_4p_5p_5D_1D_1$) x an improved strain of Daikoku ($p_4p_4P_5P_5d_1d_1$).

1225 KANDA, M., OKADA, M. and HORI, C.

(**Ecological studies on the Rikuu 132 rice**).

Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 161–66. [Japanese].

Strains of this variety from Tanegashima and Tohoku do not appear to differ genetically in spite of phenotypic differences.

1226 SLUSHER, M. W. and MULLINS, T.

Rice mill yield and grade in relation to variety and method of harvest.

Bull. Ark. Agric. Exp. Sta. 1952 : No. 526 : Pp. 36.

Varietal differences in yield of total clean rice were small. Considerable varietal differences were however obtained for yield of fancy rice, i.e. whole grains and grains broken by not more than a quarter. The short-grained varieties gave the highest yields of the fancy grade.

1227 SILVA, M. VIANNA E

Possibilidades do melhoramento de arroz a partir da introdução de formas cultivadas do estrangeiro. (**Possibilities of improving rice by introducing cultivated forms from abroad**).

Agros 1952 : **35** : Pp. 19.

Over 200 rice introductions are being studied for their possible interest for breeding in Portugal; they are listed, with indications of species, variety and provenance.

1228 CHATTERJI, U. N.

Trials with Chinese varieties of paddy.

Indian Fmg. 1952 : **11** : No. 7 : 22–23.

The results of extensive trials of Chinese rice varieties are surveyed; in general these varieties show promise. Further trials with the best varieties are being conducted in the different Indian states in cooperation with the Central Rice Research Institute, Cuttack.

1229 PIACCO, R.
Prove di acclimatazione eseguite a Vercelli nella campagna 1951. (**Acclimatization tests carried out at Vercelli during the 1951 season**).
Riso, Milano 1952 : **1** : No. 9 : 10–11.

At the Vercelli Rice Station, 26 varieties of rice, introduced originally from Japan, Indochina, the Belgian Congo and USA, underwent acclimatization tests. Only a small group of Japanese varieties very like Chinese Originario [Original Chinese] and some varieties of the fine class, Cu 100 and C 39 from the Belgian Congo, will undergo further tests. Cu 100 and C 39 possess grain with good commercial characteristics, yield well and produce healthy plants.

1230 HASHIOKA, Y.
(**The resistance of rice varietal assemblages to *Gibberella Fujikuroi*. Studies on breeding rice for resistance to disease. V.**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 167–71. [Japanese].

A large range of Asiatic varieties was inoculated with *G. Fujikuroi*, a preliminary study with four strains of the pathogen having shown that differential reaction to strains could be ignored. In general, temperate varieties were more resistant than tropical, but this distinction was far from absolute.

1231 CASATI, S.
Resistenza di alcune razze al *Fusarium moniliforme* Sh. (**Resistance of some varieties to *F. moniliforme* Sh.**).
Riso, Milano 1952 : **1** : No. 11 : 11–14.

Preliminary trials of the six rice varieties, Arborio, Sesia, Carnaroli, R. Bersani, Race 77 and Strain 136, have shown the first three to be the most susceptible and the last two the least so.

1232 SAKAMOTO, M.
(**On inoculation of the leaf sheath of rice with the blast fungus**).
Nogaku Kenkyusho Iho (Bull. Inst. Agric. Res.) 1949 : **1** : 120–29. [Japanese].

Varietal differences in resistance to *Piricularia Oryzae* can be detected by a technique involving filling the empty sheaths of the varieties with a spore suspension and then examining the sheaths microscopically after a few days for signs of invasion.

FORAGE GRASSES

1233 HUNT, I. V.
Grass production.
Adv. Leafl. Dep. Agric. Scot. 1952 : No. 23 : Pp. 15.

Strains of cocksfoot, timothy, ryegrass and fescue suitable for different purposes in Scotland are listed, with some recommendations for the composition and management of mixed leys.

1234 JULÉN, G.
Vallväxtdagen i Svalöf den 10 juni 1952. (**Herbage Plant Day at Svalöf, 10 June 1952**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 386–91.

At this meeting topical problems in plant breeding were discussed, with special reference to herbage plants. The main problem is to build up as small a collection as possible of "all-round strains" with a wide range of geographical adaptation. By increasing resistance to diseases this has already been achieved to some extent with red clover; but further work in this field is in progress and strains are being bred for special areas and from them it is hoped to obtain élites with such a marked degree of adaptability that they can be used in the larger regions of cultivation with different climatic conditions. Similar advances are being made with grasses. By selection from the meadow fescue Bottnia, a typical long-day form, a neutral-day type can be obtained that yields well not only in central Sweden but also in Norrland.

The new meadow fescue strain Sv 01206 is an example of a successful selection suitable for many purposes.

1235 PATTERSON, J. K. and LAW, A. G.
A technique study in grass strain testing.
Agron. J. 1952 : **44** : 520–24.

Results of a yield study made at Pullman, Wash., on strains of *Bromus*, *Agropyron*, *Dactylis* and *Festuca* species in various row spacings, and with Ladak lucerne in mixed or alternate rows, show that 30-inch rows are most effective for evaluating grasses grown alone. In mixtures, however, the coefficient of variation between total yields was lowest when 30-inch rows were used, but significant differences were shown between strains when the grass yield only was analysed. Variations in growth habit, competitive ability and time of flowering, which influence the yield obtained from grass-legume associations in the field, are readily estimated by mixed trial rows.

1236 HOROŠAĬLOV, N. G. and MUHINA, N. A. **(New forage plants).**
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. 9 : 24–28. [Russian].

Several varieties of grasses and leguminous forage plants, developed in recent years from wild forms of timothy, *Agropyron*, *Bromus*, *Elymus*, *Dactylis*, *Beckmannia*, *Agrostis*, *Poa*, fescue, ryegrass and clovers are listed. Mention is made of a yellow lucerne bred from a Novgorod strain Msta at the USSR Institute of Plant Industry and of a pale yellow clover found in the Maĭkop district, which give high yields of hay and seed.

1237 **Report of the first meeting of the working party on Mediterranean pasture and fodder development, Rome, Italy 19-21 May, 1952.**
FAO, Rome 1952 : Pp. 29. (Mimeographed).

A section is included on testing and seed production of promising species, varieties and strains. O. S. Aamodt suggested that trials of both introductions and native wild types, followed by studies of methods of seed production and breeding programmes, should be undertaken. He made special mention of the valuable wild material of *Medicago sativa*. V. Erkeen referred to selection work at Ankara University. W. J. Taylor drew attention to the scheme of selection and multiplication undertaken in Libya. A memorandum by D. A. Panos reported on extensive tests of forage grasses and legumes in Greece.

The recommendations dealt with the following: inventories of native and introduced material; collection of native grasses, legumes and other plants; breeding; methods of seed production; uniform methods of testing; demonstration of new varieties by advisory services; and commercial seed production and distribution.

1238 NIELSEN, E. L. and SMITH, D. C.
Interrelations of selected plant characters in Kentucky bluegrass (*Poa pratensis* L.).
Bot. Gaz. 1952 : **114** : 53–62.

At Madison, Wis., approximately 5000 plants were classified with regard to 15 characters affecting pasture and turf value, and the paired associations among these traits were determined. The data suggest that some desirable characters, e.g. early vigour, late vigour, leaf earliness, leafiness and aggressiveness, might be readily incorporated in a single strain. Certain undesirable associations, however, such as the relationship between fine-textured leaves and culms, tussock growth habit and reduced leafiness, might present difficulties in selection.

1239 JUHL, H.
Zytologische Untersuchungen an einigen Formen von *Poa pratensis* L. in Schleswig-Holstein. **(Cytological investigations on some forms of *P. pratensis* L. in Schleswig-Holstein).**
Flora, Jena 1952 : **139** : 462–76.

Critical morphological descriptions accompanied by chromosome counts of forms and variants of *P. pratensis* in Schleswig-Holstein have shown that the same chromosome number may be found in different forms and *vice versa*. Locality is no indicator of the chromosome number, nor even the degree of polyploidy, of the plants present.

The range of chromosome numbers for Schleswig-Holstein lay between 38 and 96.

No effect of chromosome number on individual characteristics was found, and, in the material examined, high chromosome number was not invariably correlated with short habit.

1240 KALTON, R. R., SMIT, A. G. and LEFFEL, R. C.
Parent-inbred progeny relationships of selected orchardgrass clones.
Agron. J. 1952 : **44** : 481–86.

Successive inbred progenies of S_0 clones of *Dactylis glomerata* were grown at Ames, Ia., from 1944 to 1951. Substantial reductions in forage and seed yields, vigour, height and resistance to diseases and winter injury were noted as inbreeding progressed; the number of days to anthesis increased with each inbred generation. Variability within each generation was observed in replicated tests, but although some S_1, S_2 and S_3 clones showed promising vigour or winter hardiness, subsequent performances indicated that none was consistently superior to the selected S_0 clones. The latter showed no significant differences among clones in respect of mean variances for yield, height and vigour, but mean log variances for leafiness and number of panicles differed significantly, suggesting some interaction between genotype and environment.

Heritability percentages for numerous agronomic characters were estimated from comparisons between the mean variances of the S_0 and S_1. Panicle number and forage yield exhibited low heritability; on the other hand, estimates for height, leafiness and vigour ranged from 35 to 56%, indicating that selection for these characters may result in genetically desirable strains.

1241 **Akaroa orchardgrass produces high seed yields in California.**
Crops & Soils 1952 : **5** : No. 1 : 26–27.

Akaroa, a fine-stemmed strain of *Dactylis glomerata* introduced from New Zealand for soil conservation purposes, has produced good quality pasture and hay in Oregon and Washington, and is expected to replace the coarse local strains over a wide area. Since long photoperiods limit inflorescence production in these northwestern states, seed is being produced in California.

1242 DE CUGNAC, A.
Sur la transformation expérimentale d'une espèce monotype en espèce polymorphe. (**On the experimental transformation of a monotypic into a polymorphic species**).
CR Soc. Biol., Paris 1944 : **138** : 845–47.

New true-breeding varieties of *Bromus arduennensis* have appeared in the F_2 of *B. arduennensis* x *B. grossus* and *B. arduennensis* x *B. secalinus*.

1243 WAGNON, H. K.
A revision of the genus *Bromus*, section *Bromopsis*, of North America.
Brittonia, NY 1952 : **7** : 415–80.

A revision of the sect. *Bromopsis* is presented, based on chromosome counts and data on pollen grain and guard-cell size, in addition to the usual study of morphological characters. Interspecific relationships and evolutionary tendencies are discussed.

1244 WALTERS, M. S.
Atypical chromosome movement in meiotic anaphase of *Bromus pitensis* x *B. marginatus*.
Amer. J. Bot. 1952 : **39** : 619–25.

Lagging chromosomes with one or two chromatid arms attenuated in the direction of one or both poles have occasionally been observed during anaphase of meiosis in *B. pitensis* x *B. marginatus*. Nonlagging chromosomes have also exhibited one or more chromatid arms attenuated towards the near pole. The behaviour of the laggards suggests that their noncentromeric movement depends primarily upon the adaptation of terminal regions of the chromosomes for poleward movement, the centromeres being inactive. Possibly movement of the attenuated but nonlagging chromosomes is produced by both centromeric and terminal activity. Chromosome end-movement has also been observed in *B. marginatus* x *B. pseudolaevipes*, *B. maritimus* x *B. marginatus* and *B. Trinii* x *B. maritimus*.

1245 BOERGER, A.
Obtención en "La Estanzuela" de un *Lolium multiflorum* resistente a *Schizaphis graminum* y *Puccinia coronata*. (**Production at La Estanzuela of a form of *L. multiflorum* resistant to *S. graminum* and *P. coronata***).
Arch. Fitotéc. Urug. 1952 : **5** : 155–56.

The ryegrass La Estanzuela 284, obtained by selection from material originating in southern Brazil, is so far the only grass that is completely resistant to the green aphid, *S. graminum*. It has also proved almost completely resistant to crown rust.

1246 COWAN, J. R.
Some plant breeding studies with tall fescue (*Festuca arundinacea* Schreb.).
Diss. Abstr. 1952 : **12** : No. 3634: p. 347. (Abst.).

In investigations on flowering habit at Minnesota University, a period of 10 days elapsed between panicle emergence and onset of flowering. The time of day at which flowering occurred was determined more by temperature and humidity than photoperiodism. Self sterility predominated, and appeared to be due to self incompatibility. The species could be readily multiplied by stem cuttings. Marked variations in self-fertility per plant were noted in different methods; three samples, with two or four panicles within each sample, were found to be sufficient for a reliable measurement of the self fertility of a single plant. Wide variability in seed production was observed. Inbreeding for one generation resulted in reduction in ability to withstand adverse weather and in yields of forage and seed.

1247 DE LITARDIÈRE, R.
Contribution à l'étude des *Festuca* du Portugal. (**Contribution to the study of the *Festuca* species of Portugal**).
Agron. Lusit. 1952 : **14** : 31–51.

Systematic descriptions of a number of Portuguese forms of *Festuca* are presented, with observations on their affinities.

1248 KILLINGER, G. B., RITCHEY, G. E., BLICKENSDERFER, C. B. and JACKSON, W.
Argentine Bahia grass.
Cir. Fla. Agric. Exp. Sta. 1951 : No. S–31 : Pp. 4.

Details are given of this highly productive variety originating from an introduction by the US Department of Agriculture (cf. *PBA*, Vol. XXII, Abst. 445).

1249 KORNEV, V. P.
(A *Sorghum halepense* hybrid on the sandy soils of the Don river valley).
Lesnoe Hozjaĭstvo (Forestry) 1951 : No. 5 : 37–40. [Russian].

Trials of a hybrid from a cross between sorghum and Johnson grass at the Višenskaja Forestry Station are reported. A few individuals resembled sorghum, but had larger and darker seed, and produced tall thick stems. Others had narrow compact panicles and developed many thin juicy short stems. The elimination of both types is advocated.

1250 SAEZ, F. A.
The cytology of *Sorghum almum* Parodi. II. The meiotic chromosomes.
Genetics 1952 : **37** : 622–23. (Abst.).

Multivalent configurations in *S. almum* ($2n = 40$) indicate that it is an allopolyploid (cf. *PBA*, Vol. XV, Abst. 639). It is thought that both autosyndesis and allosyndesis occur.

1251 TREPAČEV, E. P.
(The chemical properties of the hay of some varieties of Sudan grass).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 54–57. [Russian].

Chemical analyses of several varieties of Sudan grass, grown in different provinces of the USSR, were made by the State Commission of Varietal Trials of Cereals, Oil Plants and Grasses. VSHI*–1 had the highest nutritive value at Voronež, while Krasnodar 1967 had a similar protein content but less sugar and more cellulose.

Kinelj 90 and Odessa 25 had the best fodder value in Saratov, and the latter was also satisfactory at Moscow; Dnepropetrovsk 876 did well in Poltava and Baškiria. The sorghum-Sudan grass hybrids 17/82 and 19/58 have a high sugar content.

1252 KENNAN, T. C. D.
The improved West African Napier fodders.
Rhod. Agric. J. 1952 : **49** : 221–28.

In trials at the Matopos Research Station, Southern Rhodesia, the strains Gold Coast and Cameroons have shown general superiority over the old type of Napier grass (*Pennisetum purpureum*). They were originally selected at the Prinshoff Grass Breeding Station, South Africa, from West African seed.

1253 BLACK, G. A.
Novas espécies de Paniceae (Gramineae) do Brasil. [**New species of Paniceae (Gramineae) from Brazil**].
Bol. Tec. Inst. Agron. Norte 1950 : No. 20 : 29–37.

Five new Brazilian species are described.

1254 STEBBINS, G. L. (JUN.) and VAARAMA, A.
Chromosome behavior, fertility, and genetic segregation in synthetic allopolyploids between *Elymus glaucus* and *Sitanion*.
Genetics 1952 : **37** : 629–30. (Abst.).

F_1 hybrids ($2n = 28$) between *E. glaucus* and either *S. jubatum* or *S. Hystrix* show regular meiosis but are completely sterile. Study of chromosome behaviour and segregation for fertility and morphological characters in the allopolyploids obtained by treating the F_1 hybrids with colchicine indicates that *E. glaucus*, *S. jubatum* and *S. hystrix* are allopolyploids with one genome in common and one partially homologous. The genomes proposed for *E. glaucus* and *Sitanion* are $A_2A_2E_1E_1$ and $A_2A_2E_2E_2$, respectively. It is suggested that the sterility of the F_1 hybrids is chiefly due to cryptic structural hybridity, but is probably also to some extent controlled by genetic factors.

LEGUMINOUS FORAGE PLANTS

1255 HAGERUP, O.
Pollination in the Faroes—in spite of rain and poverty in insects.
K. Danske Vidensk. Selsk. 1951 : **18** : No. 15 : Pp. 48.

Under local conditions pollination is necessarily anemogamous or autogamous, with few exceptions. Attention is therefore drawn to the adaptation shown by local strains, including species of *Trifolium*, *Vicia* and *Lotus* which, in more southerly countries, are characterized by mechanisms to ensure cross pollination by insects. The extent of genetical control of self pollination in such plants is discussed, with emphasis on the need for further cytological and genetical investigations of Faroese strains.

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1256 AAMODT, O. S.

Report of the Thirteenth Alfalfa Improvement Conference, June 11-13, 1952.

US. Dep. Agric., Agric. Res. Admin., Bur. Pl. Indust., Soils, Agric. Engin. Raleigh, North Carolina 1952 : Pp. 86. (Mimeographed).

Stevenson, T. M. Summary report of progress in alfalfa improvement in Canada. (*pp. 2–8*).

Breeding for disease resistance and increased seed and forage yields is reviewed (cf. *PBA*, Vol. XXI, Abst. 1907). At Swift Current, Sask., creeping-rooted selections from the F_1 of creeping-rooted Siberian (*Medicago falcata*) x Ladak (*M. media*) have been back-crossed and intercrossed to produce drought resistant, nonshattering lines, with creeping roots and crowns below ground level, capable of withstanding heavy grazing. Outcrosses to wilt resistant lines are in progress.

Comparisons have been made between clones with 16, 24, 32, 48 and 64 chromosomes, obtained by colchicine treatment and hybridization, in order to determine whether common lucerne ($2n = 32$) has the optimum polyploid level for vigour, self fertility and cross compatibility.

Atwood, S. S. Summary report of 1951 *Eastern Regional Conference Group.* (*pp. 9–10*).

A brief outline of the subjects discussed mentions adaptability trials of new strains, selection of genetically valuable clones and the behaviour of new synthetics.

Lesins, K. Some data on the cytogenetics of alfalfa. (*pp. 11–19*).

At Edmonton, Alta., the fertility relationships of strains with yellow flowers and straight or sickle-shaped pods, characteristic of *M. falcata*, and of those strains grouped together with *M. sativa* on the basis of purple flowers and coiled pods were examined. Two further groups, having yellow flowers with coiled pubescent pods (*M. glutinosa*) and purple flowers with sickle-shaped pods (*M. Trautvetteri*), were also distinguished. All four intrafertile groups are interfertile when the polyploid levels are either naturally similar or rendered the same by colchicine treatment. Sterility caused by barriers other than differences in polyploid level exists between *M. sativa* and more distantly related species.

Observations on a haploid individual ($2n = 16$) arising from Grimm, and its performance in crosses with *M. falcata*, suggest that Grimm contains four closely related genomes and is thus of allopolyploid origin.

Hanson, A. A. The nature of polyploidy in alfalfa. (*pp. 20–21*).

The suggestion that *M. sativa* is a segmental allopolyploid, as defined by Stebbins (cf. *PBA*, Vol. XVII, Abst. 1563), is discussed. This theory is supported by the results of cytogenetical investigations which show that (*a*) disomic inheritance is usual; (*b*) certain characters may be inherited in a tetrasomic manner; and (*c*) multivalent associations at meiosis are relatively infrequent.

Graumann, H. O. and Matlock, R. S. Yield performance of synthetics in the first and subsequent generations following synthesis. (*pp. 22–24*).

Data on the mean forage yields of 14 synthetics comprising numerous clones with high general combining ability and of 5 mixtures each consisting of 2 clones (single crosses) indicate that maximum vigour occurs in the first generation of synthesis (Syn_1); yields gradually declined in each of 4 successive generations at Lincoln, Neb. Although combinations of only two clones tend to be more productive than multiple synthetics in Syn_1, this yield advantage is soon lost in subsequent progenies.

Robinson, H. F. Estimation and application of genetic variances in corn. (*pp. 25–26*).

Estimated additive genetic variance in yield of maize grown at the North Carolina Agricultural Experiment Station indicates the possibility of improvement by selection. Prediction equations are presented for computing the expected genetic advance with various breeding systems, including mass selection and selection from biparental progenies, polycrosses and crosses between inbred lines. Similar statistical analyses and estimates should be possible with lucerne.

Fisher, R. A. Types of genetic evidence bearing on meiotic behaviour in tetraploids. (*Abst.*). (*p. 27*).

In tetrasomic material, linkage data provide estimates of total recombination and the amount of double reduction at each locus, thus indicating the frequency of quadrivalents.

Comstock, R. E. Statistical genetics in alfalfa breeding. (*pp. 28–30*).

Methods are described for obtaining information on genotype-environment interaction variances and genotypic covariances among economically important characters by statistical analyses of data collected from several locations on more than one occasion. The extent of additivity in gene action can be estimated by polyallelic crossing among clones, and by testing clones and their polycross progenies simultaneously. It is suggested that such data may provide evidence of tetrasomic inheritance of quantitative characteristics.

Holdaway, F. G. The leafhopper problem in an alfalfa improvement program. (pp. 37–41).

Techniques for sampling leafhopper populations and evaluating injury are discussed, with special reference to breeding for leafhopper resistance at St. Paul, Minn. The need for considering the interaction of three phases of lucerne resistance, namely unattractiveness for food or oviposition, antibiosis and tolerance of infestation is emphasized.

Jones, L. G. Seed production in the southwestern United States in relation to the insect and disease problems. (pp. 42–44).

Attention is drawn particularly to the problem of supplementing wild bee populations with sufficient numbers of honey bees for adequate pollination. The effect of improving the tripping efficiency of honey bees on percentage seed set is discussed.

Law, A. G. Seed production in the Pacific Northwest in relation to insect and disease problems. (pp. 45–48).

The relative pollinating capacity of different bees in Washington is among the subjects discussed.

Henderson, R. G. Report of the Committee on Screening Alfalfa Breeding Stocks. (pp. 54–61).

Procedures adopted at Blacksburg, Va., for determining the reactions of breeding material to crown rot, mildew, bacterial wilt, leaf spots, root rot, nematode, lygus bug, aphids and low temperatures are outlined. Greenhouse and field analyses of 64 strains and varieties from all parts of the USA, with respect to seed producing ability, indicate that improvements will be possible by breeding and selection.

The reports of committees on clonal testing, regional adaptation, performance of synthetics and uniform nurseries are presented. Suggested revisions for greater efficiency of the programme for lucerne improvement include the reduction of uniform testing from a national to a regional basis.

1257 **New alfalfa varieties are being tested.**
Crops & Soils 1952 : **5** : No. 3 : p. 24.

Two synthetic lucerne varieties, A–224 and A–225, bred at the Nebraska Agricultural Experiment Station, and several new selections developed at the Wisconsin Agricultural Experiment Station, may soon be released. They all yield well, possess good resistance to bacterial wilt and show winter hardiness.

1258 Bottazzi, G. B.
Il metodo De Marzi-Bottazzi per la produzione dei medicai. (**De Marzi and Bottazzi's method for the production of lucernes**).
Ital. Agric. 1952 : **89** : 719–33.

A full account is given of the seed production method (cf. Abst. 1259) advocated by the author and De Marzi. The respective merits of this method and the American polycross technique are considered.

1259 Forlani, R.
La provenienza del seme di medica. (**The provenance of lucerne seed**).
G. Agric. Domen. 1952 : **62** : 237–38.

Bottazzi's views on the importance of using seed actually adapted to or suitable for the locality in which the crop is to be grown are quoted, with an explanation of how the effects of natural selection can be utilized to obtain plants combining hardiness and improved seed production. By subsequent selection of the best lines or clones and growing them in adjacent rows to ensure open pollination the next generation should consist largely of superior plants, the majority of which will also exhibit heterosis.

It is also suggested that in Italy high grade locally-produced seed should bear a label showing the locality and the type of environment in which it was raised.

1260 Peĭve, Ja. V. [Peive J.].
(**The activity of the Academy of Sciences of the Latvian SSR and its biological and agricultural section**).
Latv. PSR Zinātnu Akad. Vēstis 1951 : **11** : 1669–79. [Russian].

A report of a conference of Latvian, Estonian and Lithuanian biologists held in October 1951, contains a reference to a hardy lucerne, Pēterlauku 2, and an early red clover, Pēterlauku 1, which have been developed in Latvia in recent years (cf. *PBA*, Vol. XXII, Abst. 2783).

1261 Smith, D.

The survival of winter-hardened legumes encased in ice.

Agron. J. 1952 : **44** : 469–73.

Differential survival of several commercial varieties of lucerne, observed when plants were encased in ice at a noninjurious temperature (— 2·5° C), was found to correspond with the relative ability to withstand both mild and severe winters in ice-covered field plots at Madison, Wis. It is therefore assumed that injuries received while surrounded by ice are not directly caused by low temperatures. It is probable that injurious concentrations of CO_2 may be produced under sealed conditions; thus varieties with a high metabolic rate would create a lethal environment more rapidly than those with a slower metabolism. Hardy varieties may therefore have a characteristically low level of metabolic activity.

1262 **Nomad, new alfalfa for dryland range pastures.**

Crops & Soils 1952 : **5** : No. 2 : p. 27.

Nomad, a creeping variety of lucerne developed from a line originating in Oregon, is undergoing grazing tests as it has proved capable of thriving on dry soils experiencing only 10–12 ins. annual precipitation. Nomad's susceptibility to bacterial wilt will not be a serious disadvantage since the bacteria are unlikely to exist on the dry ranges.

1263 Donnelly, E. D.

Breeding for wilt resistance in alfalfa.

Agron. J. 1952 : **44** : 562–68.

The wilt resistant lucerne clone, considered by Wilson (cf. *PBA*, Vol. XVIII, Abst. 259) to be homozygous for the partially dominant gene *P*, has been used as the pollen parent in crosses with 12 selected clones at Cornell University, NY. Results have shown that in certain clones resistance to *Corynebacterium insidiosum* can be increased by recurrent back-crossing to plants carrying *P*. Other clones possessing some wilt resistance were also used as recurrent parents; these appeared to transmit genes with the same effect as *P*, but none of these back cross progenies was significantly more resistant than progenies resulting from back crosses to homozygous dominants (*PP*).

Selfed offspring of the clone homozygous for *P* comprised 54% resistant, 8% lightly infected, 22% moderately to heavily infected and 16% dead plants.

1264 **Annual Report of the Board of Control of the University of Nevada Agricultural Experiment Station for the fiscal year ending June 30, 1950**

(1952) : Pp. 61.

Grasses. Trials are being carried out on introductions, native grasses of the United States either being domesticated or considered for domestication, and on varieties selected at experiment stations in the United States.

Lucerne. Breeding is in progress to develop a high yielding lucerne resistant to bacterial wilt and stem nematode (*Ditylenchus dipsaci*). The variety Nemastan, which has a high degree of resistance to both wilt and nematode, is being selected. Polycross progenies of the selections are being tested for combining ability, seed production and resistance. Crosses are also being made between the best selections of Nemastan and good wilt resistant lines; resistant selections are being isolated from these crosses and subsequent generations, and their polycrosses are then tested. Most of the polycrosses tested in field plots for five years in comparison with Ranger, Buffalo and Nevada Common still have full stands, whereas the three varieties show stands of 25% or less, chiefly owing to nematode damage.

1265 Avlssteds- og stammeforsøg med lucerne 1947–1951. (**Provenance and strain trials with lucerne, 1947-51**).

Tidsskr. Planteavl 1952 : **56** : 159–61.

Following previous trials of Danish strains and of French du Puits and Franconian lucerne, a further series of lucerne forms of the French type were produced and included in the four-year trials, here recorded from four stations, together with some Danish, Canadian and American strains. Quality of leaf and stem, earliness, recovery capacity after cutting, and the content of crude protein and of woody material are recorded. A table is appended showing the average seed yield. The French forms and the Danish strains of French origin gave considerably more seed than Canadian Grimm, and somewhat more than Øtofte and Franconian lucerne.

1266 Brewbaker, J. L.

Colchicine induction of tetraploids in *Trifolium* species.

Agron. J. 1952 : **44** : 592–94.

The percentage survival and number of tetraploid stems with inflorescences producing tetraploid pollen grains have been recorded in some 3500 seedlings of *T. repens*, *T. hybridum*, *T. pratense* and *T. nigrescens* treated with

0·05–1·0% colchicine by several methods. The most effective method involved placing drops of aqueous colchicine on the growing tips of seedlings soon after the cotyledons had separated and exposed the apical meristem. It is considered that treatment with 0·15% colchicine for 8–12 hrs. is most effective for *T. pratense, T. hybridum* and *T. nigrescens*, whereas the relatively slow growing *T. repens* responds best to 0·3% colchicine for 18–24 hrs. The latter treatment has been used successfully with *T. ambiguum*.

1267 **Plant breeders look to nectar content as factor in pollination.**
Crops & Soils 1952 : **5** : No. 2 : p. 25.

The possibility of increasing seed set in Alsike, Ladino and red clover by breeding strains which produce more nectar and therefore support larger populations of bees is briefly discussed.

1268 WEXELSEN, H.
Undersøkelser over noen morfologiske karakterer og blomstringstid i rød-kløver (*Trifolium pratense*). [**Studies on some morphological characters and time of flowering in red clover (*Trifolium pratense*)**].
Forskn. Fors. Landbr. 1952 : **3** : 125–44.

The diagnostic value of morphological characteristics and of flowering time was studied during trials of 40 Norwegian and six foreign strains of red clover. Anthocyanin coloration and absence of the leaf spot on young plants were of no diagnostic value for the strains examined, but the following characteristics were useful in diagnosis: direction of hairs on the petioles of young plants; stem development in the year of sowing; growth type; and time of flowering. Pubescence of the leaf stalk proved of doubtful value.

1269 Het ontstaan van de Groninger Rode klaver en de mogelijkheden om de zaadopbrengst en de zaadteelt hiervan te vergroten. (**The origin of Groningen red clover and the possibility of increasing seed yield and seed raising**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1951 : **8** : 18–20.

The history and characteristics of this land race are given and the questions of improving the yield per ha. and stimulating the raising of seed of this clover are discussed.

1270 TORRIE, J. H., HANSON, E. W. and ALLISON, J. L.
Effects of sibbing on the forage yield and combining ability of red clover.
Agron. J. 1952 : **44** : 569–73.

Forage yields of successive generations of five superior sib lines grown for three years at Madison, Wis., were compared with yields given by the synthetic FC 13274. The sib lines, from which weak or diseased plants were eliminated, gave increased yields in each successive generation, but most lines yielded less than FC 13274. No yield differences were found in the Syn_1–Syn_5 of FC 13274. Comparisons between the yields of two additional synthetics, of early and late maturity respectively, and of their component sibs, have also shown that the synthetics are superior.

1271 **New strain of white clover is found to be heavy seed producer.**
Crops & Soils 1952 : **5** : No. 3 : p. 24.

Further information is given on the wide adaptability of Ala Lu (cf. Abst. 422), selected from Ladino clover at Tuskegee, Ala., on the basis of high seed yields.

1272 CORKILL, L.
Cyanogenesis in white clover (*Trifolium repens* L.). VI. Experiments with high-glucoside and glucoside-free strains.
N.Z. J. Sci. Tech. 1952 : **34** : Sect. A : 1–16.

Analyses of green weight have been carried out among progenies obtained at the Grasslands Division, Palmerston North, NZ, from crosses between large-leaved and small-leaved strains. In progenies segregating for the cyanogenetic glycoside lotaustralin and for the enzyme linamarase which hydrolyses lotaustralin to produce free HCN, there was no significant difference in green weight between plants with and without lotaustralin or linamarase. Although it has been established that the average HCN content of cyanogenetic strains in New Zealand (0·03%) is too low to poison sheep, attempts are being made to obtain a form of white clover free from both lotaustralin and linamarase. Individuals containing the enzyme but no glycoside have already been selected from eight unrelated progenies and combined to form a vigorous composite strain, which compares favourably with the locally grown cyanogenetic strains in respect of productivity.

1273 BREWBAKER, J. L. and ANDERSON, W. P.
Multiple alleles conditioning leaf markings in *Trifolium repens.*
Genetics 1952 : **37** : p. 568. (Abst.).

White leaf markings in *T. repens* are conditioned by a series of multiple alleles. All combinations of the following seven alleles have been investigated: V^h, for "high" full V; V^l, "low" full V; V^b, broken V; V^{by}, broken V with yellow tip; V^{fl}, "filled-in" V; v^p, V tip; and *v*, for absence of marking. Combinations of the first five alleles show patterns of mosaic dominance, each allele being expressed phenotypically in the heterozygote. Allele v^p is dominant to *v* and recessive to all other alleles. Although the phenotypic expressions of the alleles vary slightly according to the age and shape of the leaf and cultural conditions, the relative positions of the different markings are quite consistent. No evidence has been obtained of linkage of locus *V* with *S* for incompatibility or *M* for red midrib. Combinations of alleles showing patterns of mosaic dominance have also been obtained in autotetraploids of *T. repens* and *T. repens* (4*n*) x *T. nigrescens* (4*n*).

1274 ZVEZDKINA, A. S.
(**The spontaneous development of new varieties of spring vetch**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952: No. **7**: 19–28. [Russian].

A spring vetch, Irkutskaja Skorospelaja [Irkutsk Early], which produces mature seed under Irkutsk conditions has been selected at the Tulun Breeding Station from seed sample 1166 of *Vicia sativa* var. *variabilis*. It is hardy and reaches maturity in mid-August and yields 12–17 c. seed per ha.

In 1948 this variety spontaneously produced several new forms also adapted to Siberian conditions. Some of these plants have been identified as pertaining to varieties *typica*, *affinis*, *immaculata* and *pseudo-immaculata*, while others appeared to be unknown botanical varieties. One variety had spotted pink seed and another spotted green seed. Two promising forms, 1384 and 1385, which are still under trial, have been selected. The former is of the *immaculata-leucosperma* type with pale pink seed of good cookability and flavour. It produces high yields of green matter and seed, and shows promise as a legume grown for its seed. The other promising variety, 1385, is of the *immaculata* type and has green seed. It is an early and productive forage variety.

The spontaneous development of the new forms of vetch is discussed in the light of Lysenko's theories on the origin and evolution of biological species.

1275 JOHNSON, I. J.
Effectiveness of recurrent selection for general combining ability in sweetclover, *Melilotus officinalis.*
Agron. J. 1952 : **44** : 476–81.

Nearly 50% of the F_1 hybrids between 10 S_1 lines of Madrid grown at Ames, Ia., proved more vigorous than the S_0 parents from which the 10 lines were originally selected on the basis of combining ability in top crosses. This marked increase in vigour in the first cycle of recurrent selection suggests that the technique effectively influences the frequency of genes determining general combining ability. Superior S_1 lines of Madrid Syn-2 were recombined to produce a population having a general combining ability equal to that of the F_1 hybrids and yielding 15% more than the original Madrid.

1276 KRESS, H.
Die Auffindung einer kurzhaarigen, alkaloidfreien, platzfesten, weissamigen, frohwüchsigen, gelben Lupine. (**The discovery of a short-haired, alkaloid-free, nonshattering, white-seeded, luxuriant yellow lupin**).
Züchter 1952 : **22** : 337–38.

In 120 alkaloid-free progenies of crosses between the Gülzow sweet yellow lupin and some lines possessed of luxuriant growth two plants were found in which the pods were almost smooth, the hairs on them being only 0·394 mm. long; one of the plants bore white seeds, was vigorous in growth and had nondehiscent pods; its progeny consisted of 8 plants with short and 17 with normal hairs, the latter group being ascribed to cross pollination. Crosses with normal plants showed the gene for short hairs to be recessive and it is designated *brevis* (*brev*). The new form is useful for growing in maritime climates as its pods dry quickly.

1277 HAGBERG, A.
Undersökning över graden av korsbefruktning hos sötlupin. (**An investigation on the degree of cross fertilization in the sweet lupin**).
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 301–10.

The experiments, in which various mutants of *Lupinus luteus* and *L. angustifolius* were used as markers in cross pollination studies, were carried out on sandy soil at Ugerup and

Teckomatorp in southern Sweden. It appears that: (1) 20–25% of the plants in a yellow sweet lupin population had arisen from cross fertilization; (2) different lines of sweet lupin differed in the amount of vicinism that occurred; (3) even in small plots, as compared with field plantings, vicinism may attain 10%; and (4) pollen from a single aberrant plant gives rise on the average to about 5% of vicinism within a radius of about 0·5 m.

The blue sweet lupin material tested appeared to be self fertilized only.

1278 BOLHUIS, G. G.
Research developments. Thornless *Mimosa invisa*.
World Crops 1953 : **5** : p. 37.

Information is given on the origin and practical value of a thornless variant of *M. invisa* discovered in Java (cf. Abst. 433).

1279 **Cascade lotus, new legume for northwest coast.**
Seed World 1952 : **71** : No. 6 : 8, 47.

The birdsfoot trefoil Cascade has given good results in the coastal districts of Oregon and Washington under conditions unsuitable for lucerne or clover. One of its advantages over older varieties is the greater ease with which it can be established.

1280 SAŽINOV, G. and BRITVINA, Z.
(**Forage cabbage**).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 9 : p. 31. [Russian].

Mozgovaja Zelenaja Vologodskaja [Green Vologda Marrow stem] was developed and improved by continuous selection at the Vologda Research Station. It yields 700–1000 c. green substance per ha., 57–64% of which are leaves.

ROOTS AND TUBERS

1281 VYTČIKOV, A.
(**The methods of increasing the productiveness of root crops grown for forage**).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : 24–25 [Russian].

At the Institute of Forage Plants a mangel hybrid Eckendorf Yellow x Barres and a *Brassica Napus* hybrid Vyšegorodskaja x Švedskaja Želtaja [Yellow Swede] produced heterotic seed. A hybrid between the mangel Eckendorf Yellow and a sugar beet variety was more productive and yielded roots with a higher content of solids than sugar beet. At the Institute of Plant Industry the turnip Östersundom produced heterosis when crossed with any of the following plants: rape Grabovskaja, and turnips Tankard Želtyĭ [Yellow Tankard], Milan and Estinaĭris.

1282 VERDIEV, Z. K.
(**New forms of mangel**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : p. 78. [Russian].

Some promising material has been selected in Azerbaĭdžan from the variety Barres. Type 1 develops roots which are wholly buried below the soil. It is less susceptible than the original form to mechanical injury and drought. Types 2 and 3 give high yields of green fodder. The former produces several lateral rosettes. Type 4 is remarkable for producing large, good quality roots and seed in the first season. The 1000 seed weight is 50 grm.

1283 NISHIYAMA, I.
(**Triploid hybrids between Cruciferous vegetables and their fertility**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 199–200. [Japanese]. (Abst.).

Notes are given on the fertility of autotriploids obtained by direct and reciprocal $2x$ x $4x$ crosses within the A, C, S and R genomes.

1284 HOSODA, T.
(**On breeding new types of *Brassica Napus*. II. Hybrids of the $n = 10$ group obtained in the course of breeding**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 198. [Japanese]. (Abst.).

Three different types of amphidiploid *B. Napus* were studied: oil types (N); forage types (O); and vegetable types (C). Their seed set following pollination with various *Brassica* varieties and after selfing was determined and compared with natural *B. Napus* and *B. juncea* types. The O amphidiploids proved highly cross and self compatible, the C types were bad in both respects, while the N types were somewhat inferior to the O types.

1285 INOUE, Y. and SHIBUYA, M.
(**On flower bud differentiation in spring-sown turnips**).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 105–09. [Japanese].

Data are provided on the time of inception of flower buds in a series of Japanese turnip varieties. The period required for inception was not correlated with tendency to woodiness.

1286 Das schweizerische Richtsortiment im Kartoffelbau 1952/53. **(The Swiss official variety list in potato growing, 1952/53).**
Schweiz. landw. Z. 1952 : **80** : 1191–99.

Certain changes in the list are mentioned; for instance King Edward and Millefleurs have been removed and Saskia, Bona, Jakobi, Urgenta and Sirtema restored. The 13 varieties which now comprise the list are described.

1287 Avanzi, E.
Alla ricerca di varietà italiane di patata. Una prima realizzazione. (**Seeking Italian varieties of potato. The first success**).
Ital. Agric. 1952 : **89** : 646–48.

After a general account of the organization of Italian postwar potato breeding, which involves hybridization of varieties grown in Italy with South American potatoes, the new early variety San Michele, bred by E. Avanzi and R. Rigotti, is described and illustrated. The original cross Jubel x Tonda di Berlino strain 61–1–4 was made in 1937. San Michele has 8–12 tubers, compactly arranged at the base of the plant; these are yellow-fleshed and flattened lengthwise, with 3–6 shallow eyes. Other characteristics are hardiness, high protein content, good cooking quality and resistance to drought, blight and some virus diseases. A fine flour is obtained from it.

1288 **The National Potato-Breeding Program 1951.**
22nd Ann. Rep. to Cooperators, Beltsville, Med., 1952 : Pp. 219. (Mimeographed).

National Potato-Breeding Program, 1951.
Stevenson, F. J. (*pp. 1–4*).

A general survey of research refers to work on specific gravity and resistance to late blight, scab, *Verticillium* wilt and viruses.

United States Department of Agriculture.
Stevenson, F. J., Akeley, R. V. and Schultz, E. S. Plant Industry Station (Beltsville, Md.) and Chapman and Aroostook Farms (Presque Isle, Maine). (*pp. 5–15*).

Seed was obtained from a large number of selfed lines and new crosses including several interspecific hybrids, but *Solanum polyadenium* x *S. tuberosum* failed to set seed.

Trials of some 50,000 new seedlings and selections were undertaken to determine yielding ability, specific gravity, maturity date, fertility and disease resistance. At Aroostook Farm two scab resistant selections, B 2368–4 and B 2368–11, yielded 922 and 850 bushels of US No. 1 tubers per acre, respectively.

Akeley, R. V., Folsom, D. and Bonde, R. Verticillium *wilt.* (*pp. 15–18*).

Data are presented on the wilt reactions of some 400 hybrid seedlings grown on infected plots at Ashly Farm, Caribou, considered representative of conditions in northern Maine. The controls Katahdin and Kennebec showed 130 and 42·7% infected hills. Many lines used for breeding purposes remained wilt free. Some 7500 seedlings from breeding stocks maintained at Aroostook Farm were reinoculated with isolates of the common race of *Phytophthora infestans;* approximately 70% proved resistant.

Akeley, R. V., Stevenson, F. J. and Lombard, P. M. Effect of sprays on yield of certain potato varieties. (*pp. 19–21*).

A determination of the differential responses of Kennebec, Green Mountain, Sebago and Katahdin to fungicidal sprays at Aroostook Farm confirmed results obtained in 1950 (cf. *PBA*, Vol. XXI, Abst. 2775).

Akeley, R. V., Merriam, D., Stevenson, F. J. and Bonde, R. Date of planting. (*pp. 21–24*).

Average yields of eight varieties planted at Aroostook Farm on four dates between 5 May and 4 June, inclusive, are reported. Each variety yielded best when planted on the first date.

Akeley, R. V. and Stevenson, F. J. Varietal reaction to net necrosis. (*pp. 24–25*).

At Presque Isle, Me., Kennebec and seedlings B 606-67 and B 355-44 proved virtually immune from tuber necrosis although grown adjacent to plots of Katahdin showing 100% leaf roll infection and supporting large populations of viruliferous aphids.

Schaal, L. A. and Gregory, J. Colorado (Fort Collins), 1951. (*pp. 26–31*).

Several selections made at Greeley, Colo., have shown a high degree of scab resistance in test plots at Gilcrest, Del Norte and Woody Creek. In adaptability trials at Monte Vista, seedling 6362 gave an outstanding performance.

Hougas, R. W. Inter-regional potato introduction and preservation station. (*pp. 32–34*).

The range of tuber and seed stocks available for breeding and genetical investigations in the USA is outlined, with particular reference to varieties, species and interspecific hybrids introduced from the Commonwealth Potato Collection, Cambridge, England, during 1951.

Peterson, C. E. et al. *North-central regional potato trials*, 1951. (*pp. 35–39*).

Preliminary yield estimates, adjusted for stand differences by covariance analyses, have been obtained, following the initiation of a cooperative programme in the region. As variances from Nebraska and Wisconsin were sufficiently homogeneous, a pooled analysis was possible; no significant differences occurred between means for varieties at the two locations, and the variety x location interaction was highly significant. It is hoped that future analyses will prove useful for determining the adaptability range of particular varieties.

McLean, J. G. Pacific northwest. (*pp. 40–44*).

Adaptability trials are in progress in different districts, with special reference to yielding ability, specific gravity and resistance to scab and *Verticillium* wilt. When one *Verticillium* resistant parent is used in a cross, 64–100% of the progeny show an average *Verticillium* index of 0–20; families derived from two highly resistant parents are 100% within the 0–20 range.

Dykstra, T. P. et al. *Southern project* (*Louisiana headquarters*). (*pp. 45–52*).

Seedlings selected on the basis of giving promising performances in different southern states are listed.

Edmundson, W. C. U.S.-Colo. Potato Field Station, Greenley, Colo. (*pp. 53–57*).

Data are presented on the characteristics of seedlings obtained by crossing scab resistant lines of red and white varieties developed at Greenley with seedlings from Beltsville, Md., carrying a factor for blight resistance. Although red parents were used in 31 crosses only 4 seedlings with dark red tubers were produced.

In addition to work summarized below, detailed reports are given of yield trials of old and new varieties in the following states: Alabama, Connecticut, Florida, Louisiana, Maryland, Massachusetts, Minnesota, Montana, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, Rhode Island, South Carolina, Virginia, Washington and Wisconsin.

California

Davis, G. N. (*pp. 60–63*).

In Kent County seedling B 2161–3 proved as resistant to scab as Menominee and gave large enough yields to suggest commercial possibilities. On the Hollister test plot several varieties showed tolerance of *Verticillium* wilt.

Delaware

Brasher, E. P. (*pp. 67–69*).

In two consecutive years seedling B 73–18 has proved outstanding with respect to both starch content and specific gravity, and has given yields comparable with those of Irish Cobbler and Katahdin; it is recommended for naming and release to local growers.

Florida

Eddins, A. H. (*Susceptibility of potato varieties and seedling selections to corky ringspot*). (*pp. 71–72*).

The reactions of 30 new seedling selections were determined by growing on infected soil with several commercial varieties as standards. Since 19 proved symptomless it has been suggested that some may have escaped infection.

Indiana

Ellis, N. K. (*p. 73*).

Greater emphasis is being placed on improvement of cooking quality. Numerous seedlings selected for yielding ability, shape, colour and resistance to scab have recently been discarded owing to poor quality.

Iowa

Peterson, C. E. et al. (*pp. 74–78*).

The majority of crosses made at Ames have involved parents with resistance to scab and the common form of late blight. Advanced selections are, however, being tested for resistance to five races of *Phytophthora infestans* before being incorporated in the breeding programme. The flowering habits of *Solanum* spp. reported to be resistant to scab, virus Y or leaf roll are being investigated; it is hoped that some clones will prove compatible with *S. tuberosum*. F_1 progenies of *S. demissum* x *S. tuberosum* and *S. andigenum* x *S. tuberosum* are being back-crossed to parent selections.

Russet Rural was outstanding among 15 commercial varieties and 5 numbered selections as a variety suitable for making crisps (1) immediately after harvest, (2) following storage at 40° F for 3 months with 2 weeks of reconditioning at 75° F or (3) after the same period of storage with 4 weeks of reconditioning. Three numbered selections produced crisps of superior quality at harvest but failed to recondition after storage, indicating that selections cannot be made on the basis of quality immediately after harvest.

Maine

Folsom, D. Relationship of insect counts to leaf roll spread in resistance test at Highmoor Farm, 1939–1950. (*p. 84*).

No correlation was found between fluctuations in the numbers of leaf insects and variations in the occurrence of leaf roll on particular clones from year to year.

Folsom, D. Leaf roll resistance, 1951, at Highmoor Farm. (*pp. 85–87*).

In addition to the differential reaction of varieties, large tubers showed a marked tendency to develop more severe leaf roll symptoms than smaller tubers. The leaf roll resistant seedling B 789–338 (X 1276–185 x B 61–3), introduced from Beltsville, Md., proved well suited to local conditions and was also resistant to late blight; its yielding ability resembles that of Katahdin but its cooking quality is superior.

Folsom, D. and Merriam, D. Yield test of leaf roll resistant seedlings at Aroostook Farm 1951. (*p. 87*).

Seven leaf roll resistant seedlings have yielded more than Katahdin, but only four are of sufficiently good quality to warrant further tests.

Simpson, G. W. and Bonde, R. Leaf roll resistant seedlings. (*pp. 88–92*).

Reactions of hybrid progenies and selfed lines to leaf roll infection transmitted by viruliferous aphids at Presque Isle from 1949–51 are tabulated. Many hybrid survivors are derived from crosses involving Imperia or Kepplestone Kidney.

Terman, G. L. and Akeley, R. V. (*pp. 93–97*).

Data on yield and specific gravity of numerous varieties and selections at four trial centres are listed and discussed.

Michigan

Wheeler, E. J. and Moore, H. C. (*pp. 111–13*).

Hybridization was effected at East Lansing between seedling selections of high specific gravity, suitable for making crisps, and other high yielding selections with disease resistance. Two outstanding seedlings, B 69–17 and B 505–3 (Chippewa x 47102), are to be increased for commercial release; B 505–3 shows medium to late maturity, good tuber shape and resistance to scab.

Muncie, J. H. and Trytten, G. W. (*pp. 114–15*).

First year seedlings from 31 crosses have been subjected to scab resistance trials on infected plots at the Lake City Experiment Station. Several selections with lesion types 0, 1 and 2 will be used as parents in future crosses. Seedlings were also tested for reaction to *Fusarium Solani* var. *Eumartii.*

Minnesota

Krantz, F. A., Eide, C. J., Gowan, F. A. and Lauer, F. I. (*p. 116–18*).

Genetical analyses of successive inbred generations, their parental clones and progenies from varietal crosses, top crosses and single crosses are in progress at the Potato Research Station, Castle Danger. Crosses have been made between scab resistant parents, between clones resistant to late blight, and between selections possessing resistance to both late blight and scab. Several seedlings resistant to virus X are being studied for agronomic characteristics prior to hybridization with selections combining scab and late blight resistance.

Three strains of *Solanum demissum* resistant to several races of *Phytophthora infestans* are being crossed with *S. tuberosum* and *S. Phureja* to increase the blight resistance of interspecific hybrid selections.

Eide, C. J., Krantz, F. A., Logsdon, C. E. and Thurston, H. D. (*pp. 118–20*).

Methods of testing for reaction to late blight are described. Many tubers scratched lightly before being dipped in a spore suspension developed blight symptoms, while noninjured tubers of similar origin escaped infection.

Nebraska

Werner, H. O. Potato breeding-horticulture department. (*pp. 126–35*).

Evaluation of breeding lines and advanced selections grown under different cultural conditions in various parts of the state has been carried out. One breeding line, 59.41–P1, showed a high degree of scab resistance in all tests; it is a late maturing type with pinkish red tubers.

New York

Livermore, J. R. (*pp. 142–43*).

Comparative analyses of new seedlings with specific gravities ranging from 1·110 to 1·080 indicate that although specific gravity measurements are helpful for the selection of good quality tubers, final choice of a superior table variety should be based on cooking tests.

Peterson, L. C. and Reddick, D. (*pp. 148–49*).

Some 200 crosses were effected to improve the disease resistance of otherwise agronomically desirable varieties. Seedlings carrying blight resistant factors derived from *Solanum demissum* are being tested for reaction to races BC and BD of the pathogen.

Analyses of selfed progenies of varieties differing in susceptibility to black spot have shown that there is a tendency for black spot to be more severe when specific gravity is high, but the correlation between these characteristics is not high.

North Carolina

Nielsen, L. W. Evaluation of potato selections for resistance to Pseudomonas solanacearum. (*pp. 154–56*).

Irish Cobbler was used as a standard for determining degree of resistance to bacterial wilt. Three seedlings, B 2414 (NC 3544 x B 355–24), B 2415 (NC 3544 x NC 3460) and B 2442 (Calrose x Flava), remained symptomless throughout the season.

North Dakota

Hoyman, W. G. (*pp. 158–60*).

Methods for determining seedling reaction to scab and viruses X and Y are outlined. At Fargo, B 515–2 showed a high degree of scab resistance.

Schultz, J. H. and Johansen, R. H. (*pp. 161–64*).

Most of the selections used for breeding possessed a high degree of resistance to scab, late blight and virus Y. ND 457, which is field resistant to virus Y, was used in many crosses.

Progeny analyses of Red Pontiac suggest that this variety is a periclinal chimera. Reversion to the parental Pontiac occurs occasionally, so that tuber selection for red colour is necessary in commercial plantings.

Ohio

Sleesman, J. P. (*pp. 165–67*).

Data on reaction of F_1 seedlings to leaf hoppers at Wooster show that progenies from crosses involving B 478–1, B 721–1 and B 724–15 are generally resistant. A number of wild *Solanum* species proved resistant to leaf hoppers but were susceptible to flea beetles.

Pennsylvania

Hartman, R. E. Wart immunity tests, 1951. (*pp. 171–73*).

Seedlings showing a promising degree of wart resistance on heavily infected soil at Bernice, Sullivan County, are listed, with details of their origin.

Mills, W. R. (*pp. 174–77*).

The substance of this paper on the genetics of resistance to known races of *Phytophthora infestans* has already been summarized (cf *PBA*, Vol. XXII, Abst. 2038).

South Carolina

Epps, W. N. (*pp. 180–82*).

The degree of browning developing on peeled tubers exposed to direct sunlight for 60–90 mins. was found to agree with the ability to withstand damage and blackening during transport. This test may therefore be used in the future selection of seedlings.

South Dakota

Richardson, L. T. (*p. 183*).

The scab resistant selection B 515–2 does not yield well under local conditions, which tend to induce growth cracks.

Virginia

Parker, M. M. (*pp. 185–87*).

Considerable differentiation was observed between varieties with respect to seed piece decay. Cobbler and Kennebec were resistant to decay but Cherokee, Pontiac and Sebago proved very susceptible if cut and stored before planting.

Washington

Locke, S. B. (*pp. 188–89*).

Varieties and seedling selections showing some field resistance to leaf roll at three trial centres are listed.

Menzies, J. D. (*pp. 190–92*).

Several seedlings have survived a fourth year of exposure to leaf roll; their parentage is indicated. Among progenies of recent crosses the percentage of resistant individuals is increased by using partially resistant parents; most seedlings derived from Russet Burbank proved susceptible. Attempts are being made to combine the russet skin and long tuber of Russet Burbank with leaf roll resistance.

West Virginia

Westover, K. C. (*pp. 197–201*).

Tabulated data are presented concerning the origin and characteristics of seedlings selected at the Reedsville Experiment Farm on the basis of vigour, yield, tuber quality or disease resistance.

Gallegly, M. E. (*pp. 217–19*).

Cytological and genetical studies are in progress to determine the reaction of *Solanum* spp. to all known races of late blight. Resistant selections are listed. Seedling trials for resistance to early blight, tip burn and scab are also being carried out.

Wisconsin

Cooper, D. C., Rieman, G. H. and Hougas, R. W. Mycorrhiza-like mycelium in potato tubers. (*pp. 202–03*).

Results of investigations with cultivated potatoes and tuber-forming species of *Solanum* indicate that mycorhizal associations in the rhizome are responsible for tuberization (cf. *PBA*, Vol. XXI, Abst. 2775).

Reiman, G. H. and Stokes, G. W. Potato variety and advanced generation selection trials in Wisconsin during 1951. (*pp. 204–07*).

Breeding for scab resistance is in progress, special attention being given to the development of homozygous parents, following methods adopted for the production of maize inbreds. Two advanced generation selections, D 27.50 and D 49.50, derived from Menominee x Wis. 302–6, are being increased for adaptability trials in different parts of the state. The quality and performance of scab resistant M 804 have been so outstanding in recent trials that it may be released shortly.

Webb, R. W., Larson, R. H. and Walker, J. C. Histological and immunological relations of strains of potato leaf roll virus. (*p. 208*).

Four virus strains have been identified by their differential effect on *Physalis floridana* stems, causing varying degrees of phloem necrosis and irregular cambial activity. Each strain immunizes the host against infection by the remaining strains.

Larson, R. H. and Akeley, R. V. Incidence of physiological internal tuber necrosis. (*pp. 208–09*).

A wide range of variation was noted in the susceptibility of seedlings to internal necrosis at the Hancock Experiment Station.

Darby, J. F., Larson, R. H. and Walker, J. C. Variation in virulence and properties of potato virus Y strains. (*pp. 209–11*).

This paper has already been summarized (cf. *PBA*, Vol. XXII, Abst. 1259).

Wyoming

Riedl, W. A., Starr, G. H. and Rincker, C. M. (*pp. 212–16*).

Results are given of trials of F_1 seedlings derived from crosses between red-skinned types of desirable quality and lines resistant to scab and ring rot.

1289 KATIN-JARCEV, L.
(New varieties of potato for Siberia).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : p. 56. [Russian].

Varieties bred recently at Omsk include Severjanin [Northerner] and Sedov which are tolerant of high temperatures during tuber formation. Both were obtained by directed training of hybrids between an early maturing clone of Early Rose and Katahdin. Severjanin is early and productive; its tubers are large, pink and with good keeping properties; the flavour is good. Sedov is also an early potato. It produces high yields of large white tubers with shallow eyes; the quality is good.

Work to improve Early Rose is in progress.

1290 DE HAAN, H.
Het optreden van mutatie bij de aardappel. (**The occurrence of mutation in the potato**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1951 : **8** : 3–4.

The way in which bud sports may arise in potato clones maintained by mass selection is explained with examples of the cytological and morphological processes underlying the formation of such mutant types.

1291 BOS, B. C.
Het voorkomen en aard van knopmutaties bij de aardappel. (**The occurrence and the nature of bud mutations in the potato**).
Meded. Ned. Alg. Keuringsdienst Landbouwzaden Aardappelpootgoed 1951 : **8** : 11–14.

Bud mutations, recorded in Dutch and other varieties of potatoes, are briefly mentioned with observations on the frequency, stability and possible causes (cf. Abst. 1290) of such aberrant forms. Experiments in Holland during 1949 and 1950 showed that the bud mutants in Dutch varieties are frequently periclinal chimeras. In the Rode Eersteling bud sport, however, in which not only tuber colour but also the starch content and flavour are affected, the mutation must have occurred at some different stage in development as compared with the changes resulting in periclinal chimera formation.

1292 PETERSON, C. E. and GWINN, A. B.
Influence of vine killing and 2,4-D on yield, specific gravity, and vascular discoloration of potatoes.
Amer. Potato J. 1952 : **29** : 253–67.

At Clear Lake, Ia., during 1949 and 1950, yields of the early maturing Cobbler were unaffected when haulms were cut or treated with 2,4-D to facilitate harvesting, whereas yields of later varieties, Sebago, Yampa and Kennebec, were significantly reduced.

1293 McLean, J. G. and Stevensen, F. J.
Methods of obtaining seed on Russet Burbank and similar-flowering varieties of potatoes.
Amer. Potato J. 1952 : **29** : 206–11.

The difficulty of using Russet Burbank and other varieties as female parents on account of the early abscission of the blossoms can be overcome either by mechanical girdling of the stem or by growing cut stems in nutrient solutions. The plant reacts to these treatments by accumulating carbohydrates above the points of constriction or in the cut stem, the seed balls being retained as storage organs.

1294 Malinowski, E., Bernadowski, J. and Zamoyska, M.
Potato grafting experiments : I. The effect of tomato stock on the flowering and fertility of potato.
Bull. Acad. Polon. Sci. Lettres, Cracovie 1951 (1952) : Sér. B : 137–46.

Both Ulster Chieftain and Erstling (=Eersteling) [Duke of York], which do not normally flower in Poland, produced inflorescences when grafted on stocks of Golden Jubilee tomato. When the stocks were without lateral shoots or had numerous lateral branches, the scions of both varieties failed to set seed but developed aerial tubers. On stocks with 2–4 lateral shoots, however, both potato varieties developed fruits with viable seeds. A comparison of pollen from nonfruiting and fruiting inflorescences showed that inflorescences capable of bearing seed produced a higher percentage of well-formed pollen grains which germinated more rapidly in artificial media and developed longer pollen tubes.

When similar grafts on tomato were made with a self sterile species, *Solanum Rybinii*, anthers produced pollen grains capable of germinating on the stigma of the same flower.

1295 Semenov, S. D.
(The starch content of potato tubers).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 28–36. [Russian].

Trials of several potato varieties at the USSR Industrial Alcohol Institute suggest that productiveness can be combined with a high starch content. Cornea produced more tubers with a high starch content than Smyslovskiĭ, Soviet and Muscovite.

1296 Toxopeus, H. J.
De kweker en de voeraardappel. **(The breeder and the fodder potato).**
Landbouwk. Tijdschr., 's-Grav. 1952 : **64** : 555–58.

In 1951, the Dutch Plant Breeding Foundation began an investigation of the possibility of combining a yield of tubers equal to that of Voran with a starch and protein content as high as that of Noordeling, as a step in the breeding of a fodder potato. The importance became clear of using parents the weight of whose tubers submerged in water is high, thus indicating a high content of solids. If necessary, a potato of high feeding value could probably be bred in a relatively short time, provided it need not also be suitable for human consumption. The relative importance of characters such as depth of eye, and shape, size and colour of the tubers for such a special fodder type is explained.

1297 Stevenson, F. J.
Inheritance of disease resistance in the potato.
Phytopathology 1952 : **42** : p. 483. (Abst.).

A short review is given of the chief results of potato breeding for resistance to late blight and several other diseases in the United States.

1298 Eddins, A. H.; McCubbin, E. N., Ruprecht, R. W. and Stevenson, F. J.
Adaptability of new potato varieties and seedling selections to the Hastings area.
Circ. Fla. Agric. Exp. Sta. 1950 : No. S–25 : Pp. 15.

Data are presented on the yielding ability, date of maturity, reaction to low temperatures during early growth stages and resistance to diseases shown by 26 varieties and 24 numbered selections at the Potato Investigations Laboratory, Hastings, Fla., from 1938 to 1950. Sebago has proved best adapted to the area in recent years, but in 1950 was outyielded by a selection, B 76–43 (96–44 x 528–170), which has since been released as Pungo (cf. *PBA*, Vol. XXI, Abst. 1153).

1299 Smith, W. L. (Jun.) and Smart, H. F.
Natural barriers protect potatoes from soft rot infection.
Phytopathology 1952 : **42** : p. 481. (Abst.).

Potatoes were stored for 1, 3 and 6 months at 40° F. The development of suberin and periderm was then studied in slices kept in moist chambers 1 to 4 days at temperatures ranging from 40 to 80° F. Differences in the development of these layers occurred, depending upon the length of previous storage period and on the temperature. Varietal differences in the development of suberin and periderm were also noted, Irish Cobbler showing the greatest and Mohawk the least development. When these slices were inoculated with bacteria causing soft rot and kept at a temperature of 70° F, the degree of infection depended on the amount of suberin and periderm which had been formed.

1300 THURSTON, H. D. and EIDE, C. J.
The appearance and survival of new races of *Phytophthora infestans*.
Phytopathology 1952 : **42** : 481–82. (Abst.).

Isolates of *Ph. infestans* from the resistant variety Cherokee (cf. *PBA*, Vol. XXI, Abst. 2775) produced heavy infection on several clones deriving their resistance from Müller's W races or *Solanum demissum*. Pathogenicity did not increase in reinoculations carried out to test for adaptation. It is therefore suggested that races such as that found on Cherokee may result from occasional genetic changes and become abundant only on a selective variety. Further experiments indicated that the isolate from Cherokee lacked survival ability in a mixture with an ordinary field isolate. This new race might not be found except in the presence of a considerable number of plants of the selective variety.

1301 MAKLAKOVA, G. F.
(**The question of the resistance of the potato to *Phytophthora***).
Doklady Vsesojuz. Akad. Seljsk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1952 : No. **9** : 24–28. [Russian].

The new hybrid varieties Kameraz 3 and Kameraz 4 showed a high degree of resistance to *Phytophthora* in infection trials at Puškin. On the other hand, Kameraz 1, Kameraz 2, Krasnoufimsk, Ural, Stahanovite and some other potatoes normally carrying resistance became susceptible to the disease when the tubers were weakened by continuous germination due to unsatisfactory storage conditions.

1302 WINKELMANN, A.
Biotypen des Kartoffelkrebserregers in Westdeutschland. (**Biotypes of potato wart in Western Germany**).
NachrBl. dtsch. PflSchDienst., Berl. 1952 : **4** : p. 140.

Reference is made to the further appearance of biotypes of *Synchytrium endobioticum* capable of attacking varieties hitherto classed as resistant such as Ackersegen, Bona and Heida, and the view is expressed that the chance of new biotypes arising by mutation is higher in dense populations of the fungus such as develop when susceptible varieties are grown on infected ground.

1303 TOXOPEUS, H. J.
Aardappelveredeling en erfelijkheid. (**Potato breeding and inheritance**).
Erfelijkh. i. Prakt. 1952 : **13** : No. **3** : 1–4.

In this lecture to the Netherlands Genetics Society, the speaker suggests that the inheritance of resistance to *Synchytrium endobioticum* in potatoes is explicable on the basis of tetraploid inheritance, as originally suggested by A. P. Lunden (cf. *PBA*, Vol. IX, Abst. 1098 and Vol. XI, Abst. 742). Lunden postulated a major dominant factor X conditioning resistance in the simplex condition and two other independent factors also causing resistance when present in at least the simplex condition. The last two factors were not considered in this lecture.

The value of the X_2x_2 genotype found in Kerr's Pink and Doon Star is stressed, since, when crossed with susceptible genotypes, 5 out of 6 of the resultant seedlings are resistant in contrast to only 50%, when an Xx_3 parent is used. In theory crosses between two Xx_3 varieties should give a ratio of one resistant to three susceptible seedlings, but in fact the resistant forms do not occur so frequently.

Dutch work on breeding for resistance to *Phytophthora infestans* by crossing *Solanum demissum* with *S. tuberosum* and repeated back crossing, followed by selection in the third or fourth backcross generation, is also reviewed.

1304 AYERS, G. W.
Studies on *Verticillium* wilt of potatoes.
Amer. Potato J. 1952 : **29** : 201–05.

Varieties tested at Charlottetown, Prince Edward Island, Canada, showed three types of reaction to *Verticillium* wilt: (1) true plant resistance, found in Houma and seedling F 4328; (2) susceptibility to soil-borne inoculum but only slight capacity to disseminate the disease by means of mycelia in the tubers, as in Katahdin, Green Mountain and Keswick; and (3) susceptibility to soil-borne inoculum and a pronounced capacity to disseminate the disease by means of infected tubers, e.g. Irish Cobbler, Sebago and Chippewa.

1305 Bradley, R. H. E., Ganong, R. Y. and Rideout, D. W.
Aphid (Homoptera: Aphididae) infestations on Chippewa, Katahdin, and the newly released blight-resistant varieties Canso and Keswick.
Amer. Potato J. 1952 : **29** : 221–24.

When grown under field conditions near Fredericton, NB, Canada, during 1951, the blight resistant varieties Canso and Keswick (cf. *PBA*, Vol. XXI, Abst. 1152) developed aphid infestations similar in intensity to those on Chippewa and Katahdin.

1306 Folsom, D.
Practical control measures for leaf-roll.
Amer. Potato J. 1952 : **29** : 229–33.

The difficulties encountered in developing potatoes highly resistant to leaf roll in Maine are briefly referred to. The failure in some varieties to develop net necrosis as a symptom of leaf roll has been more useful than the search for clear-cut inherited resistance. Lack of net necrosis appears to be an inherited character, and to be correlated in some varieties with susceptibility to mahogany browning resulting from continued low temperature in storage. The following are among the varieties free from net necrosis: Bliss, Calrose, Chippewa, Essex, Katahdin, Kennebec, Mesaba, Placid and White Rose.

1307 Hutton, E. M.
Some aspects of virus Y resistance in the potato (*Solanum tuberosum*).
Aust. J. Agric. Res. 1952 : **3** : 362–71.

Virus Y development in the leaves of resistant hybrids was found to be restricted and finally eliminated by an inactivating system. No evidence was obtained suggesting that resistance was due to hypersensitivity. Inheritance of resistance to virus Y was studied in a cross between two resistant hybrids, 11–76 and 11–79, and another between 11–76 and the moderately resistant Katahdin. In both F_1 tuber progenies, resistance to virus Y and immunity from virus X were closely associated. The results suggested that resistance to Y depends upon the nulliplex or simplex condition of a major gene, and susceptibility upon the quadriplex condition. Possibly the duplex state results in a localized necrotic reaction to Y, as in Katahdin. Systemic mottle and necrosis, as shown by the variety Factor, may be governed by the triplex condition.

1308 Lähde, V.
Perunan istutusajasta. **(On the time of potato planting).**
Valt. Maatalousk. Tiedon. 1944 : No. 199 : Pp. 12.

Experiments performed in Norway and Sweden and later in Finland are described, in which variation in yield of potatoes is considered in relation to tuber treatment and time of planting over a range of soil types and climatic conditions. Some comparative data for a number of Finnish and foreign varieties are included.

1309 Tjutin, M. G.
(Sweet potato, a forgotten economic plant).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. **11** : 59–60. [Russian].

Soviet varieties with better keeping properties than introduced material were bred in the 'thirties at Suhumi. Suhumskaja Madeira [Suhumi Madeira], Record Hybrid, Pervenec SSSR [USSR First-born] and Dessertnyĭ [Dessert] all produce over 60 metric tons of tubers per ha.

FIBRES

1310 **Twenty-Ninth Annual Report of the Indian Central Cotton Committee 1950** : Pp. 65.

Genetics

The following investigations are reported from the Institute of Plant Industry, Indore, and other stations:—

Associations between jassid resistance and economic characters are being studied. As in the previous year, seeds of Buri 107 and local Cambodia with green fuzz segregated into green and white fuzz grades. White fuzzed seed of Buri 107, however, produced both white and green seeded plants, instead of breeding true.

Selections of American x Asiatic hybrids backcrossed to American varieties were tested at Surat and elsewhere; some derivatives combined high ginning percentage and long staple but were late maturing; these strains are being further selected. At Indore, F_6 progenies from crosses of *Gossypium Thurberi* and *G. Raimondii* with *G. arboreum* and cultivated American species still showed considerable heterogeneity in seed characters and staple length; most progenies had a halo length of over 27 mm.

Statistics

Investigations included a study of the effects of selection for high and low halo length from the F_2 onwards in *G. arboreum* crosses. Improvement in mean halo length in lines selected for high values is still being obtained, although at a slightly diminished rate after the F_7. Lines selected for low halo length reached the minimum values in the F_4 or F_6; they have subsequently tended to have a slightly increased length. Progenies selected for high halo length have a significantly lower ginning percentage than those selected for low values and in most cases a significantly higher yield.

Breeding

Bombay

At Broach, work on the development of cotton resistant to *Fusarium* wilt and with better yield, ginning percentage and spinning quality than Vijay continued.

In Khandesh, strain 197–3, from a cross between Jarila and *G. neglectum* var. *roseum* is being extensively tested. It is superior to Jarila in yield and ginning outturn; it also has slightly longer staple.

Progress is reported in the development of wilt resistant cottons for the Surat tract, by selection of 1027 ALF or by crossing 1027 ALF with BD 8 and other resistant strains.

Breeding to produce improved types of *G. herbaceum* in the Dholleras tract continued. The strain Kalyan again showed superiority over the local Wagad in both yield and ginning outturn. Kalyan was crossed with Vijay and other long staple varieties to improve its staple length.

Work on Dharwar-American cotton aims at the production of an early maturing type superior to Gadag 1 in yield, staple length, ginning percentage and red leaf blight. The strain Laxmi shows superiority over Gadag 1 in several respects; it was further crossed with interspecific hybrid selections from Surat to improve its fibre properties. None of the derivatives of (Co. 2 x *G. tomentosum*) x Co. 2 suffered from jassid attack.

At Amreli, promising selections were obtained from crosses of Pratrap with L 520, a long staple *G. arboreum* variety from southern India.

Punjab

The American strains AC 101 and AC 102 continued to show superiority in yield and ginning percentage compared with Hariana (cf. *PBA*, Vol. XXII, Abst. 1270). Three reselections of Hariana, 216 F/3, 216 F/14 and 216 F/48, were better than the parent strain as regards yield, ginning outturn and lint length. It is expected that irrigated desi cotton will shortly be replaced by American cotton.

Valuable strains of American cotton have also been developed for East Punjab, with a view to replacing the short stapled desi types.

Progress is also reported in the production of American varieties with a staple length of 1 in. or more.

Madras

Breeding is in progress to develop a medium staple strain suitable for cultivation on red soils and with the yielding capacity of the short staple Mungari cotton grown at present. The new strain 881 F is to be multiplied on a large scale. Among the hybrid progenies under test, 11 have shown a superiority in staple length over 881 F. The Hyderabad variety G 4M 11 continued to be stenosis resistant.

Work on cotton of the Cocanadas type has resulted in strains 336 B and 2545–8, with satisfactory yield, lint colour, ginning percentage and spinning value.

Breeding on Cambodia cotton aims at producing (1) a long staple, American variety yielding well when grown as an irrigated cold season crop, and (2) an exotic type suitable for nonirrigated regions. In work on the former type, MA 11 and HA 11 have been found to be valuable parents for improving yield; Coimbatore types, Parbhani American and MA VIII have proved useful for improving lint length.

In breeding the Westerns type a medium staple strain with early maturity, wilt resistance and ginning outturn of 33% or more is being sought as a substitute for H 1. Several strains at the experimental stage show promise.

Breeding to develop a white Northerns type possessing the length and fineness of the staple of N 14, a ginning percentage of about 33% and wide adaptability continued. Promising hybrid selections are under investigation. One of these, 5202, combining good lint yield and quality is to undergo further extensive trials.

Work is also being carried out on the Tinnevelly and Karunganni cottons to produce by hybridization a strain with a staple length of over $\frac{15}{16}$ ins., and suitable for cultivating in the central and southern districts. Selections 6435–2 and 6874 yielded 600 lbs. of seed cotton per acre, and had a ginning outturn of 34–36% and staple length of nearly 1 in.

One scheme for producing long staple cotton comprises the development of (1) Upland strains possessing a staple length longer than $1\frac{1}{16}$ in. and capable of maturing in $5\frac{1}{2}$ months, and (2) *G. barbadense* varieties for cultivation in the coastal districts of South Arcot. Among the hybrid cultures under investigation, four had a higher ginning percentage and longer staple than Co. 2/B 40. New crosses were effected between Mesilla Acala and Sealand 542 and other promising long-linted cottons. A scheme is also in progress to produce long-staple American varieties for growing as a winter crop in central districts and Sea Island cotton suitable for the western coastal region. Of the *G. hirsutum* selections, five equalled Co. 2 in yield; two of these were superior to Cambodia 2 in staple length and ginning outturn. Imported types of *G. barbadense* from the West Indies and Egypt were much more susceptible to blackarm than acclimatized varieties. The South American perennial cottons, Moco and Quebradinho, gave good yields and suffered less from pests, diseases and drought than Sea Island.

Madhya Pradesh

In the scheme to develop improved strains of desi and American cotton for the Nagpur-Wardha tract, tests were carried out on strains of both types. In the district trials, H 420 and No. 91 produced the highest yields among the desi strains. Of the American strains, Buri 0396 again gave the highest yield.

Trials were also carried out in connexion with the schemes to produce: (1) improved strains of desi and American cotton for the Akola-Amraoti districts; (2) better strains of Jarila, with strong stems and satisfactory opening of bolls, for the Buldana tract; and (3) selections of Verum 434 and other desi cottons, with longer staple and a ginning outturn of 33 to 35%, for the Ghat region.

Uttar Pradesh

The programme of hybridization of *G. arboreum* has now been terminated. The only hybrid derivatives of desi cotton which have maintained some superiority over the control C 520 are those involving C 520 and C 420. Among American types, one F_{10} segregate of Iran 1/9 x Perso-American has exhibited superiority over the latter parent as regards yield, lint length and ginning outturn.

Assam

Improvement of hill cotton aims at the production of a short staple type with good yielding capacity and high ginning percentage. A study was made of 166 cottons from Assam and other countries. Of the short staple types, Mikir 159 and 168 are to be retained for further observation.

Hyderabad

Work on the production of strains of Gaorani 12 with wilt resistance and higher ginning outturn, for the Parbhani area, has resulted in several promising selections. Other desi strains have also been secured, with higher ginning outturn than Gaorani 12 and fairly good resistance to wilt.

Mysore

In a varietal trial of Mysore-American types, with Co. 2 as control, MA V gave the highest yield. Egyptian cottons were also subjected to tests. Progenies of crosses of MA V with Tidewater or Express possessing a yielding ability equal to that of MA V, staple length of 30–33 mm. and ginning outturn of 32–36% were selected for further study under both rain fed and irrigated conditions.

Rajasthan

Work on the development of improved American cotton for Mewar, superior in staple length and spinning quality to Indore 1, has resulted in four promising strains, M 48–4, M 48–16, M 48–42 and M 48–46.

Madhya Bharat

In varietal trials of Malvi strains at the Institute of Plant Industry, Indore, Malvi 12 again equalled the control Malvi 9 in yield of seed cotton per acre and exceeded it in wilt resistance, ginning percentage and spinning performance.

1311 Pressley, E. H.
Arizona 44 cotton.
Reclam. Era 1952 : **38** : 253–55, 258–59.

The upland cotton Arizona 44, suitable for irrigated cultivation, was developed from a cross between New Mexico 1517, a variety adapted to high altitudes and with good spinning quality, and Santan, a high yielding strain of California Acala, adapted to low altitudes. It has given higher yields of lint than P 18–C, the now unpopular variety in irrigated areas, and shown better yarn strength and spinning quality.

1312 Kulebjaev, V. G.
(The influence of the female parent upon the formation of the heritable characters in cotton hybrids).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **79** : 325–28. [Russian].

At Iolotanj, Turkmenia, many direct and reciprocal crosses between various *Gossypium barbadense* varieties were made to determine the heritable characters of the F_1. The material comprised 29 fine fibre varieties, bred in the USSR. The experiments showed that in most crosses the length and strength of the fibre, ginning percentage, earliness, habit and large boll were transmitted from the female parent.

1313 DEODIKAR, G. B.
Cytogenetic studies on crosses of *Gossypium anomalum* with cultivated cottons. II. Substitution and addition of *anomalum* chromosomes to the genome of cultivated tetraploid cottons.
Indian J. Agric. Sci. 1950 (1952) : **20** : 399–414.

Studies on the first back cross [(*G. hirsutum* x *G. anomalum*) colchicine-doubled] x *G. hirsutum* have already been reported (cf. *PBA*, Vol. XXI, Abst. 1186). The present paper describes observations on the second back cross to the recurrent parent Co. 2. Second back cross plants from BC_1 x Co. 2 had chromosome numbers of $2n = 56–75$. Deducting 26 chromosomes contributed by the male parent Co. 2, it therefore appears that female BC_1 gametes containing 30–49 chromosomes were functional. In the reciprocal, male gametes with $n = 26–29$ were compatible with the female gametes ($n = 26$) of Co. 2. These results explain the marked reciprocal differences observed in fertility and economic characters. The back cross BC_1 x Co. 2 showed a much greater range of variation than Co. 2 x BC_1, but since most of the plants were sterile, the more fertile Co. 2 x BC_1 provides better scope for selection. In addition to 1–3 extra chromosomes from *G. anomalum*, Co. 2 x BC_1 plants also contained up to 7 substituted chromosomes. The data so far obtained suggest that, apart from its value in breeding for tolerance of diseases and pests, *G. anomalum* may also be a source of improvement in staple length, fineness, strength and other fibre properties.

1314 FERNANDO, L. H.
Recent advances in the improvement of cotton in Ceylon.
Trop. Agriculturist 1952 : **108** : 29–36.

A survey of breeding work undertaken at the Hambantota Cotton Station since 1937, when numerous long-stapled strains were introduced from Africa and India, shows that the methods of selection employed have led to marked improvements in varietal quality and purity. Success is largely attributed to the adoption of Harland's mass pedigree system of selection (cf. *PBA*, Vol. XV, Abst. 661). Particular reference is made to selected strains of BP 79, which are now superior to the original introduction from Uganda in respect of vigour, boll production, yielding ability, fibre quality and halo length. Other high yielding strains include 5143 x Cambodia, Mwanza 561, Mwanza Local, Co. 2 and Co. 3.

1315 WARE, J. O.
Cultivated cotton varieties in the Old World. Pp. 33. (Mimeographed).

This general review discusses the evolution and spread of species and races of *Gossypium* in each of the continents and subcontinents, with evaluations and descriptions of the main types and varieties grown in particular countries. The aims and progress of local breeding programmes are also described.

1316 MENZEL, M. Y.
Polygenomic hybrids in *Gossypium*. III. Somatic reduction in a phenotypically-altered branch of a three-species hexaploid.
Amer. J. Bot. 1952 : **39** : 625–33.

A plant among the mosaic-forming hexaploid progeny of *G. hirsutum-Thurberi* $[2(AD)_1D_1]$ x *G. hirsutum-Sturtii* $[2(AD)_1C_1]$ produced two mutant branches, which arose from the same node of the main stem and which were grafted on *G. hirsutum* rootstocks. The mutants differed markedly from the parent hybrid in both flower and leaf characters. Like the original plant, they showed mosaicism. They differed from each other only in degree of alteration of the flower parts. The original plant had $2n = 78$, the two mutants $2n = 69$. A comparison of chromosome pairing in the original hexaploid and the mutants revealed that the 9 chromosomes missing in the latter represented four trivalent-forming sets of homologues; probably most of the chromosomes lost were members of the D genomes. The mutants are regarded as cytochimeras, resulting from a common somatic reduction.

1317 MENZEL, M. Y. and BROWN, M. S.
Viable deficiency-duplications from a translocation in *Gossypium hirsutum*.
Genetics 1952 : **37** : 678–92.

Cytological investigations are reported on a translocated line, designated 2B–1, phenotypically indistinguishable from its parent Acala 911 from which it arose during atomic irradiation at Bikini (cf. *PBA*, Vol. XXI, Abst. 436). Fragment A, comprising most of the long arm of chromosome 2, has been translocated to chromosome 1; the remaining centric fragment of chromosome 2 is termed C. Since there is no evidence that broken ends of chromosomes unite with unbroken ends, it is assumed that a minute terminal segment, x, of chromosome 1 has been broken off; x may be attached to the broken end of C or may be lost, in which case the broken end of C has healed (cf. *PBA*, Vol. XI, Abst. 979). On back-crossing to normal lines, 2B–1 has yielded normals, heterozygous translocations and seven nondisjunctional complexes, four being deficiency duplications, two being double deficiencies and one a double duplication with respect to C, A and x. Both duplications and deficiencies for C, A and x are functional in ♀ gametes, while duplications of A, and probably of C and x, and deficiencies of x are transmissible through the pollen. The recovery of $2n + 2A - 2x$ and $2n + A–C–2x$ plants demonstrates, for the first time in cotton, the transmission of a small deficiency by means of pollen and its recovery in a homozygous condition.

Since cytological detection of these unbalanced complexes is facilitated by the inequality of the interchanged fragments, such translocated lines are useful for linkage studies in *G. hirsutum*, and may provide means of comparing the genotype of allotetraploids with that of their diploid relatives.

1318 Douwes, H.
Colchicine treatment of young cotton seedlings as a means of inducing polyploidy.
J. Genet. 1952 : **51** : 7–25.

Two techniques are described, both involving soaking the seeds in water for 24 hours and then removing the testa to eliminate discrepancies arising from the differential permeability of the seed coat in various *Gossypium* spp. In the first method the whole embryo was placed between sheets of blotting paper soaked in 0·025 and 0·05% colchicine. Tetraploid configurations were seen in pollen mother cells in individuals treated with 0·025% for 4–12 hours or 0·05% for 1–8 hours, but the roots of many seedlings were severely damaged by exposure to colchicine. In order to avoid the stunting caused by root injuries, the second method was devised. Colchicine treatment was delayed until 4 days after germination, when the roots were sufficiently differentiated to allow the shoots only to be inverted in the solution. Polyploidy was thus induced, with little interference in the rate of growth, by a 2 hour treatment with 0·05% at 23–26° C; although exposure for 10 hours failed to produce lethal effects, it is thought that a 6 hour treatment may prove most efficient for the genus as a whole.

1319 Kulebjaev, V. G.
(Changes obtained by vegetative hybridization in the floral structure of the genus *Gossypium*).
Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR) 1951 : **78** : 1219–21. [Russian].

A *G. barbadense* variety, 85331, was grafted on a *G. arboreum* variety, 01665, at the Turkmenian Cotton Research Station. Changes were observed in the F_0 and later generations, extensive segregation in respect of various characters occurring in the second seed generation. In one of the segregates the staminal column was split into five separate divaricate segments. The change was heritable.

1320 Gadkari, P. D.
Further studies in the genetics of lintlessness in Asiatic cottons.
Indian J. Agric. Sci. 1950 (1952) : **20** : 415–30.

Seven genes for lintlessness have so far been identified in Asiatic cottons: h_a, h_b, li_a, li_b, li_c, li_d and li_e. The factors h_a and h_b produce a glabrous condition of the whole plant; li_c also has a pleiotropic action, reducing the general growth rate of the plant organs. With the exception of li_c, all these genes for lintlessness are complementary to each other for lint production. The factor li_c is now regarded as unrelated to the other six, and has been found to be epistatic to li_a, li_b, li_d and li_e. The gene li_e, determining the mutant Nandyal hairy lintless, is newly discovered. A modifier was detected which when homozygous altered the expression of li_a, li_b, li_d and li_e into a fully linted condition. No linkage of li_a, li_b and li_e with L, L_c, Y_a or R_2 was found; li_d segregated independently of R_2.

1321 **Annual Report of the Director of the Technological Laboratory, Indian Central Cotton Committee for the year ending 31st May 1951** : Pp. 25.

The results of spinning and fibre tests carried out during the year under review on cotton strains and varieties supplied by breeders, standard Indian varieties and other material are surveyed. Investigations on technological problems are also reported. A technique for spinning small-scale samples weighing as little as 60 grm. is proving valuable in testing the quality of breeders' material. The strength of attachment of fibres to the seed coat has been found to have an important influence upon varietal and specific ginning quality. Progress has also been made in work on the prediction of spinning value from fibre properties.

1322 JAGANATHA RAO, C., RAGHAVAN, A. and APPA RAO, P.

A review of recent progress in the work for the evolution of jassid and blackarm resistant strains of Cambodia for the Tungabhadra Project area.

Indian Cott. Gr. Rev. 1952 : **6** : 147–55.

Introductions reported to be resistant to jassid or blackarm showed susceptibility in trials carried out at the Agricultural Research Station, Siruguppa, Madras. Reselection of acclimatized types had therefore to be undertaken. Reselection of the synthetic tetraploid, BC 68, from Surat, Bombay, resulted in the jassid resistant culture 1821. In addition, reselections of MA 2 from Mysore yielded strains with improved resistance to this pest. By reselection of the Surat back cross BC 134 x CW 3–1–7, the blackarm resistant culture 2196 has been obtained. Both cultures are being extensively used in crosses with economic types, and an attempt is being made to combine the two resistant characters in one strain.

1323 KNIGHT, R. L.

The genetics of blackarm resistance. IX. The gene B_{6m} from *Gossypium arboreum*.

J. Genet. 1953 : **51** : 270–75.

Gene B_{6m} has an intensifying effect upon blackarm resistance due to major B genes. By itself it confers no resistance; in *G. arboreum* it is associated with B_4. The gene B_{m6} is being transferred to synthetic blackarm-resistant types of Sudan Sakel (*G. barbadense*) and upland (*G. hirsutum*) carrying B_2 and B_3. Sakel $B_2B_3B_{6m}$ selections have shown a resistance closely approaching immunity in the Sudan. Results with upland cotton carrying both B_2 and B_{6m} suggest that the latter factor will be of considerable value in reinforcing blackarm resistance under Uganda conditions.

1324 KNIGHT, R. L.

The genetics of jassid resistance in cotton. I. The genes H_1 and H_2.

J. Genet. 1952 : **51** : 47–66.

A general survey is made of research leading to the conclusion that jassid resistance depends on hairiness of the abaxial leaf surface. Recent studies undertaken by the Empire Cotton Growing Corporation, Sudan, concerning the influence of two major genes are described. The resistance of two perennial forms of *Gossypium barbadense*, Carpulla from Ecuador and Tangüis from Peru, is shown to depend on the basic gene H_1, which is identical with that previously called H^B or H^{TAN} by Harland (cf. *PBA*, Vol. IX, pp. 488–89 and Vol. XI, Abst. 611), accompanied by a number of minor genes. Similarly, H_1 is the basic gene determining resistance in the MU 8*b* variety of *G. hirsutum* from India, and in St. Ignatius, a variety of *G. hirsutum* var. *Marie-galante* from British Guiana; intensifying genes augment the effect of H_1 in both cottons. Resistance in Kapas Purao, an American Upland variety from the Philippines, is due to a gene phenotypically similar to H_1, accompanied by minor genes increasing hair length; the major gene appears to be linked with one of two complementary genes controlling chlorosis.

The gene determining the dense tomentum of *G. tomentosum* is shown to occupy a separate locus from H_1; it has been designated H_2, and corresponds with Harland's H^{TO} (cf. *PBA*, Vol. IX, pp. 488–89).

1325 WARE, J. O.

Origin and performance of principal cotton varieties in Arkansas.

Bull. Ark. Agric. Exp. Sta. 1952 : No. 527 : Pp. 65.

Information is provided on the origin of old and present-day cottons in Arkansas, and on the results of variety trials conducted at several centres during 1946–50.

1326 VON WETTSTEIN, F.

Untersuchungen zur plasmatischen Vererbung. I. *Linum*. (**Investigations on plasmatic inheritance. I. *Linum***).

Biol. Zbl. 1946 : **65** : 149–66.

Reciprocal differences were noted in the F_2 of the crosses between the flax strains "tall" and "procumbent." All progenies with tall plasma were fertile, while 25% of the F_2 with procumbent plasma were pollen sterile, an effect attributed to the homozygous gene pair *mm* from the tall strain in the presence of procumbent plasma. Various floral characteristics appeared to be determined also by the *Mm* alleles.

1327 BOERGER, A.

Calidad de fibra en linos de La Estanzuela. (**Fibre quality in flax at La Estanzuela**).

Arch. Fitotéc. Urug. 1952 : **5** : 111–17.

Fibre quality was determined by microscopic examination of cross sections of the stem and by small-scale retting tests, both carried out by F. Tobler in Switzerland. The best quality was found in forms arising from the cross E2E3, although those possessed of resistance to *Septoria* were inferior in quality to the susceptibles.

1328 Malyh, P. and Kločkov, V.
(The best varieties of fibre flax).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 9 : 24–25. [Russian].

Several varieties of flax made standards in 1952 are described. Svetoč [Torch], 1288_{12}, 806_3 and Prjadiljščik [Spinner] had been developed before the war at the USSR Flax Institute, and Stahanovite at the Western Zone Flax Research Station. A new variety, I–9, was obtained at the USSR Flax Institute by hybridization. It is a tall and productive mid-season variety carrying resistance to lodging, but susceptible to *Fusarium* and *Polyspora*. The fibre quality is good.

Several other new promising varieties are mentioned. I–5 and I–2 were bred at the USSR Flax Institute, L–1120 at the Smolensk, and Važgantas at the Lithuanian Breeding Station.

1329 Marlatt, R. B.
Races of *Fusarium oxysporum* f. *Lini* in Arizona.
Diss. Abstr. 1952 : **12** : No. 4294 : p. 567. (Abst.).

The experiments included tests of the responses of ten flax varieties to isolates of the above fungus. The isolates all differed in pathogenicity. The varieties exhibited different amounts of inhibition of seed germination in the presence of a toxic substance derived from a solution culture of one of the isolates. Two flaxes which performed well on a wilt-infested plot were least susceptible to inhibition.

1330 Rizet, G.
Sur l'origine endomitotique de la polyploïdie dans les racines du *Cannabis sativa*. **(On the endomitotic origin of polyploidy in the roots of *C. sativa*).**
CR Soc. Biol., Paris 1945 : **139** : 300–02.

The polyploid cells that occur in the root meristem, especially the periblem, of *C. sativa* appear to arise by an endomitotic process, and not by nuclear fusion.

1331 Rizet, G.
Sexualité et polyploïdie chez *Cannabis sativa*. **(Sexuality and polyploidy in *C. sativa*).**
CR Soc. Biol., Paris 1946 : **140** : 284–85.

At meiosis in diploid male plants, a pair of chromosomes was observed which separated earlier than the rest at anaphase. In certain cases this pair seemed to be heteromorphic but the evidence was too doubtful to throw light on the question of sex determination. In the tetraploid males, the pair referred to could not be distinguished; tetravalents were infrequent. In crosses between colchicine-treated male and female plants, a tetraploid predominantly female F_1 was produced. Hybrids between the F_1 tetraploids and either diploid or tetraploid pollinators gave rise to a variable progeny, including intersexes.

1332 Bredemann, G.
Weitere Beobachtungen bei Züchtung des Hanfes auf Fasergehalt. **(Further observations in breeding hemp for fibre content).**
Züchter 1952 : **22** : 257–69.

The author gives a survey of his 17 years' work on hemp breeding and of the subsequent research carried out by R. von Sengbusch in continuation of the programme directed to producing a diecious hemp with high fibre content to meet the grower's various demands (cf. Abst. 499).

1333 Datta, R. M.
Irregular meiosis in *Corchorus olitorius* Linn.
Sci. & Cult. 1952 : **18** : p. 149.

Univalents and a varying number of bivalents have been observed in *C. olitorius* ($2n = 14$). Evidence has been obtained of secondary association.

1334 Mukherjee, S. K.
Meiosis in some *Corchorus* spp.
Sci. & Cult. 1952 : **18** : p. 91.

Meiosis in *C. tridens* and *C. trilocularis* was found to be regular. Both species have a chromosome number of $2n = 14$.

1335 Kundu, B. C. and Rao, N. S.
Origin and development of axillary buds in jute (*Corchorus capsularis*).
Nature, Lond. 1952 : **170** : p. 1128.

The results of a study of the developmental anatomy of axillary buds in one branching jute and three nonbranching varieties are reported; the investigation was made in connexion with breeding nonbranching varieties suitable for India. In branching varieties the axillary bud developed from a portion of apical meristem detached in the leaf axil during vacuolation and growth; in nonbranching jute this meristem was in most cases completely absent. Irregular development of extraaxillary buds occurred in all three nonbranching varieties. A single recessive gene determines the nonbranching habit, possibly by affecting heteroauxin production.

1336 ORLOV, V.
(Soviet jute).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 9 : p. 27. [Russian].

Mention is made of Soviet varieties, remarkable for the good quality of their fibre and productiveness, which have been bred by Pereverzev and Kuljtijasov.

1337 UMALI, D. L. and VALDEZ, C. G.
The fertility relationship of abacá with pacol and canton.
Philipp. Agric. 1951 : **35** : 171–85.

At the College of Agriculture, Laguna, Philippines, compatibility relationships between three species of *Musa* have been studied in reciprocal crosses. In general, stigmas proved most receptive between 10 and 12 a.m.; pollen grains lost their viability after 24 hours. No seeds were obtained from the reciprocal crosses *M. textilis* x *M. Cantoni* and *M. errans* x *M. Cantoni*; where *M. Cantoni* was used as the male parent, sterility is thought to be due to the large number of empty or irregularly shaped pollen grains produced by this species. Some viable hybrids resulted, however, from crosses between *M. textilis* and *M. errans*, indicating that it may be possible to combine immunity from bunchy top and mosaic, possessed by *M. errans*, with the desirable fibre qualities of *M. textilis*.

1338 SAITO, K.
(Studies on the induction of polyploidy in some cucurbits and its utilization. I. On polyploid plants of *Luffa cylindrica*).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 193. [Japanese]. (Abst.).

Colchicine-induced tetraploids of *L. cylindrica* have been obtained, and triploid lines from intercrossing diploid and tetraploid strains. Brief notes are given on the morphology of the fruit and seed setting capacity in the polyploid strains.

1339 Lunds Universitets Årsberättelse 1950–1951. **(Annual Report of Lund University 1950-51).**
Lund 1952 : Pp. 119.

Heribert Nilsson has completed his work on species formation and evolution and carried out a revision of the main complex hybrids in *Salix*. H. Hjelmqvist began a study of embryo sac types and continued his investigation on the systematic classification of the Juglandaceae. At the Genetics Institute plant breeding work was continued in collaboration with the Swedish Seed Association, Svalöf.

SUGAR AND STARCH PLANTS

1340 BANERJI, K. C.
Some indigenous canes of northern India now extinct.
Agric. Anim. Husb. Uttar Pradesh 1950 : **1** : No. 3 : 37–42.

Descriptions are given of 11 types of indigenous sugar cane whose cultivation has now almost come to an end.

1341 ABBOTT, E. V.
Report on visits to Peru, Colombia and the Canal Zone.
Sug. Bull., N. Orleans 1952 : **31** : 45, 50–52.

A general account of sugar cane variety problems in each country refers to the susceptibility of H 32–8560 to *Sclerospora* disease in Peru, the world collection of breeding material at Summit, Panama Canal Zone, and breeding in progress at Palmyra, Colombia. Some interspecific hybrids developed at Palmyra from crosses involving cold resistant wild canes from Turkestan and *Saccharum robustum* from New Guinea have proved very vigorous under local conditions, producing tall erect stalks with large diameter and satisfactory sucrose content; they are also resistant to mosaic, chlorotic streak and eyespot. These promising hybrids are being introduced to the USA for adaptability trials.
Although the Canal Zone is not a good locality for breeding, it is pointed out that occasional crosses are effected, taking advantage of inflorescence production by certain varieties which do not normally flower at other breeding stations.

1342 **Annual Report of the Indian Central Sugarcane Committee for the year 1950-51** (1952) : Pp. 133.

Sugarcane Breeding Institute, Coimbatore
The following varieties have been found useful as parents in crosses: Co. 513, Co. 615, Co. 677, Co. 678, Co. 683, Co. 285 and Co. 617. The breeding value of *Saccharum spontaneum* forms is under investigation, emphasis being laid on resistance to frost, drought, salinity and waterlogging and on high sucrose content. In breeding for resistance to *Ustilago* no relation has been found between the reactions of parents

and hybrids. Collections of *S. spontaneum* and related genera were made in Uttar Pradesh. Second back cross progeny ($2n = 50$) of *S. officinarum* x *Sclerostachya* were crossed with maize and *Erianthus*, to ascertain the homology of the second set of the basic chromosome complement of *S. officinarum*. Crosses of *S. Barberi* with *S. spontaneum* and *S. officinarum* were effected, to break up the amphidiploid constitution of *S. Barberi*. In a few seedlings ($2n = 40$) resulting from hybridization between the second back cross progeny ($2n = 50$) of *S. officinarum* x *Sclerostachya* and *Narenga* ($2n = 30$) the fourth glume was awned. The production of this awn is ascribed to a constitution of 15 *Sclerostachya* + 10 *S. officinarum* + 15 *Narenga* chromosomes. Survey of chromosome numbers in interspecific *Saccharum* hybrids has led to the conclusion that the functioning of unreduced gametes is largely confined to *S. officinarum*. The only other species possessing this capacity appears to be *S. spontaneum*, but only in intergeneric crosses.

Karnal Substation

The peeling pattern of the stem epidermis has been found to be a varietal characteristic.

Indian Agricultural Research Institute, New Delhi

Breeding for resistance to *Colletotrichum* red rot and *Ustilago* is in progress.

1343 RIOLLANO, A.
Nuevas variedades de caña de azúcar. (**New sugar cane varieties**).
Bol. Univ. Est. Exp. Agríc. Puerto Rico 1951 : No. 91 : Pp. 102.

The results of 28 varietal tests made in Puerto Rico with 24 varieties produced in the island and 15 introductions are presented. The Puerto Rico varieties PR 902 and M 336 consistently excelled POJ 2878 and all other canes tested, both in sugar yield per acre and in sucrose content, while PR 905 and 907 were equal to POJ 2878 in yield and exceeded it in sucrose content. Certain promising canes are recommended for further testing.

Brief descriptions are given of the above canes.

1344 **Eighteenth Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ending September 30th, 1951** : Pp. 47.

Detailed reports are given on large numbers of crosses, seedling selections and trials carried out at the Central Sugar Cane Breeding Station, Barbados, and on the performance of varieties in Antigua, Barbados, British Guiana, Jamaica, St. Kitts and Trinidad. The outstanding third year seedling, B 4744 (Co. 421 x B 4098), which produces a large number of tillers with very long thick shoots, has a sucrose content 1% better than B 37161. Although it is slightly susceptible to mosaic in Jamaica, it has been released to planters as a general purpose cane. Another cane of the same series, B 47419 (POJ 2878 x B 34104), has proved particularly well-suited to areas of high and intermediate rainfall, and has been released with B 4744. Both new varieties ratoon satisfactorily.

B 45151, which performed well in seedling trials (cf. *PBA*, Vol. XXII, Abst. 1303), gave heavy yields of first ratoon cane; its juice quality is good. B 46364 (B 35247 x B 3337) also yielded well as a ratoon, but the juice was not up to the standard of seedling canes. Both B 41211 and B 41227 continued to outyield other varieties; B 41211 ratoons ripen later and stand longer without rotting than the seedling cane.

1345 McM., A.
Experiment station activities. Field and variety trial results.
S. Afr. Sug. J. 1952 : **36** : 635–39.

Results of sugar cane field trials at the Mount Edgecombe Experiment Station and on estates in Natal are reported. Although N : Co. 291, N : Co. 293 and N : Co. 339, recently released by the South African Sugar Association (cf. *PBA*, Vol. XXII, Abst. 2876), have performed well, they were outyielded by the newly developed variety N : Co. 376 (Co. 421 x Co. 312) in respect of tons of cane and sucrose per acre. The sucrose content of N : Co. 376 is lower than that of N : Co. 310 but compares favourably with Co. 301.

The season favoured inflorescence formation and a large number of crosses were made.

1346 **Fifty-second Annual Report of the Bureau of Sugar Experiment Stations, Queensland, 1952** : Pp. 55.

Trials of introductions, recently developed seedlings and ratoon selections have continued. Although after several years of hybridization the sugar content of *Saccharum robustum* has been improved, the stooling capacity of progenies derived from this species is so unsatisfactory that few further crosses with *S. robustum* are contemplated until the strains introduced from New Guinea in 1951 have been evaluated; the giant introduction 51 NG 91 (cf. *PBA*, Vol. XXII, Abst. 570) may transmit good stooling characters. Many new crosses were made between noble canes and *S. spontaneum* hybrids. Q 28, which rarely produces viable pollen, flowered freely at Freshwater and was used as a male parent in several crosses. Examination of Badila canes has confirmed the existence of at least five types; all five are being tested to determine the most suitable parent for future breeding.

All crosses made in the past season are listed; those crosses, made in the previous year, from which promising seedlings were obtained are indicated. The release of Q 57 is reported (cf. Abst. 1352).

1347 Abbott, E. V.
Seedling testing and disease work at the Houma station during 1951.
Sug. Bull., N. Orleans 1952 : **30** : 344, 375–76, 380.

Details are given of the parentage of some of the promising seedlings selected for further trial at Houma, La. Many selections are derived from F 36–819, which has proved a very valuable parent, especially in combination with CP 36/105, CP 33/229 and CP 33/372.

Trials have been undertaken to determine the reaction of commercial varieties to mosaic virus strain A, which is becoming increasingly prevalent in the area.

1348 Buzacott, J. H. and Hughes, C. G.
La expedición australiana a Nueva Guinea. (**The Australian expedition to New Guinea**).
Bol. Asoc. Téc. Azuc. Cuba 1952 : **11** : 173–79; 231–39; 269–77.

A Spanish translation is published of the report on the sugar cane collecting expedition to New Guinea (cf. *PBA*, Vol. XXII, Absts. 568 and 1296).

1349 King, N. J.
Are we depending too much on new cane varieties ?
Cane Gr. Quart. Bull. 1952 : **16** : 53–55.

It is possible that some varieties of *Saccharum officinarum* from New Guinea (cf. *PBA*, Vol. XXII, Absts. 568 and 1296) will directly increase sugar production in Queensland, especially in the Bundaberg area where canes collected from relatively cool highlands should prove adaptable. Improved varieties may result indirectly from hybridization, using in particular the giant form of *S. robustum* (cf. *PBA*, Vol. XXII, Abst. 570). It is however pointed out that new varieties will not give rise to increased yields without simultaneous improvements in cultural conditions.

1350 Buzacott, J. H.
The sugar cane varieties of New Guinea.
Cane Gr. Quart. Bull. 1952 : **16** : 43–46.

An account is given of the economic importance, in New Guinea, of varieties of *Saccharum officinarum*, *S. robustum* and *S. spontaneum* collected for breeding purposes by the 1951 Queensland expedition (cf. *PBA*, Vol. XXII, Absts. 568, 570 and 1296).

1351 Coleman, R. E.
Studies on the keeping quality of sugarcane damaged by freezing temperatures during the harvesting season 1951-52.
Sug. Bull., N. Orleans 1952 : **30** : 342–43, 377–80.

Further data concerning the effects of autumn field temperatures, below freezing point, on varieties grown in Louisiana (cf. *PBA*, Vol. XXI, Abst. 2874) support the results obtained the previous year. Deterioration of most varieties does not begin immediately; the purity and sucrose content of CP 44/101, CP 43/47 and CP 36/13 were maintained for periods up to 30 days after injury, thus allowing ample time for harvesting.

1352 King, N. J.
The new variety—Q. 57.
Cane Gr. Quart. Bull. 1952 : **16** : p. 48.

This new sugar cane, due for release in 1953, was bred from Q 27 x Q 31 at the Meringa Sugar Experiment Station, Qd., and inherits some of the characteristics of the early maturing Oramboo from which Q 31 was derived. Q 57 is capable of rapid germination, producing well-stooled uniform stands of erect stalks which are robust and heavy but resistant to lodging. The sugar content is good and of better quality than Trojan early in the season.

1353 de Silva, A.
Sugar industry for Ceylon. Progress towards its establishment.
S. Afr. Sug. J. 1952 : **36** : p. 647.

Experiments conducted in the field have shown that varieties of sugar cane introduced from Java are well suited to local conditions, withstanding storms and remaining resistant to lodging except when growth is very tall. About 50 varieties from all parts of the world are undergoing trial in the search for canes with less luxuriant growth and higher sugar content than the Javanese types.

1354 NAWROCKI, Z.
Studia biometryczno-hodowlane. Cz.I. O metodzie dyskryminacji wielocechowych populacji hodowlanych buraków cukrowych. (**Biometrical and breeding studies. Part I. On a method of analysing breeding populations of sugar beets**).
Ann. Univ. M. Curie- Skłodowska 1951 : **6** : 303–18.

The mathematical basis is worked out for generalizing the theory of correlations involving several variates so that it may be applied to the analysis of groups of observations derived from different populations. The theoretical results obtained were then used in a study, at the Więcławice Breeding Station, of roots of sugar beets from three different breeding populations. The following relations were found to exist: (1) a high positive correlation between length and breadth of the root; (2) a positive correlation between yield of roots and (*a*) root length and (*b*) root breadth; (3) no correlation of any practical significance between sugar content and root length; (4) a negative correlation between sugar content and root width; and (5) only a slight negative correlation between sugar content and yield of roots.

1355 BRYKCZYŃSKI, J.
Zagadnienie rejonizacji odmian buraka cukrowego. (**The problem of regionalization of sugar beet varieties**).
Roczn. Nauk Rol. 1952 : **60** : 95–118.

Though a plan for regionalization of sugar beet varieties in Poland would not be justifiable on the basis of the differences observed in yield and sugar content, the possibility in the future of raising beets specially adapted to particular geographical regions is not to be excluded, in spite of the absence of marked climatic differences in the country.

The effect of light on bolting was clearly demonstrated by a comparison of the percentages of bolters in experimental plots in northern and southern Poland; it was found that the varieties less resistant to bolting should not be sown in the northern districts.

1356 STOCKEBRAND, A.
Einwirkung von Ultraschall auf Keimung und Wachstum der Zuckerrübe. (**Effect of ultrasonics on germination and growth of sugar beet**).
Z. Acker-u. PflBau 1952 : **95** : 401–22.

Exposures of over 90 minutes reduce germination capacity, inactivate diastase and reduce yield.

1357 MARINČIK, A. F.
(**The behaviour of the seed progeny of vegetative hybrids of sugar beet, obtained by grafting components of different ages**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 59–66. [Russian].

At the USSR Institute of Sugar Beet, Kiev, the influence of stocks on scions was intensified by grafting germinating shoots on roots ready for transplanting into the field. Changes were observed in the grafts and first seed generations of I 1305, a high yielding sugar beet, on M 6, a high-sugar type, and of chard on M 6. The first generation of I 1305 on M 6 was as productive as the scion variety but had a higher sugar content, while that of chard on M 6 produced heavier roots with a higher sugar content than chard or M 6.

1358 COONS, G. H.
Control of sugar beet diseases through resistance—1918-1952.
Phytopathology 1952 : **42** : p. 482. (Abst.).

A short reivew is given of results achieved in breeding sugar beet for resistance to curly top, *Cercospora* leaf spot, and other diseases in the United States. In the case of virus yellows, a search is being made for factors for resistance in wild species of *Beta*.

1359 GIDDINGS, N. J.
Two recently isolated curly top virus strains.
Phytopathology 1952 : **42** : p. 514. (Abst.).

Two new strains of curly top virus have been discovered: (1) an unusually virulent strain (No. 11) attacking the sugar beet variety SL 68, previously considered to be highly resistant; and (2) a strain (No. 12) infecting the potato more readily than other strains, and producing symptoms known as green dwarf in this crop. Some of the more recently developed varieties of sugar beet show more resistance to strain 11 than SL 68.

1360 De vergelingsziekte der bieten. I. Samenvattend verslag over het onderzoek in de jaren 1940–1948. II. Aanvullende opmerkingen bij het verslag over 1940–1948. (**Beet yellows. I. Report surveying research in the years 1940-48. II. Supplementary observations relating to the report for the years 1940-1948**).
Meded. Inst. Ration. Suikerprod. 1952 : Pp. 291.

Report No. I records the successful use of the ecological test for virus infection and the failure of attempts to discover resistant varieties. Communication No. II mentions that, though no immune plants were found by Hartsuijker, in 1948 the author discovered, in the same plots, some plants less seriously affected than the rest, and selection is being continued with the progeny of these plants and with other material. Results are very promising and the special technique on which selection and breeding are based will be described later.

All wild beet species, artificially infected, have proved susceptible. With some wild species, masking of the symptoms is a complication.

1361 Forsøg med danske og svenske stammer af sukkerroer til fabrik 1950–1951. (**Trials with Danish and Swedish strains of sugar beet for the factory, 1950-51**).
Tidsskr. Planteavl 1952 : **56** : 149–50.

In this preliminary report on trials of strains of Maribo and Hilleshög, the Danish polyploid beet Maribo P is cited for its high yield of roots with high sugar content and high sugar production at all testing centres as well as the highest yield per ha., 379 hkg. Germination capacity of the seed was however low. The roots were uniform in shape and smoother than those of the other strains. Some bolters were observed.

STIMULANTS

1362 Argyroúdis, D., Stamatínis, N. and Binópoulos, X.
(**Report on the work of the Greek Tobacco Institute for the agricultural year 1948-49**).
Georgikon Deltion (Agric. Bull.), Athens 1950 : **3** : No. 4 : 10–34. [Greek].

An account is given of experiments in crossing indigenous and foreign varieties, and results of varietal trials are described, with reference to standing ability, yield and resistance to disease. Results of trials with foreign varieties are described. Studies of mutants in the institute's botanic garden are noticed.

1363 Argyroúdis, D., Stamatínis, N. and Binópoulos, X.
(**Report on the work of the Greek Tobacco Institute for the year 1950-51**).
Georgikon Deltion (Agric. Bull.), Athens 1952 : **3** : No. 5 : 48–72. [Greek].

The indigenous varieties Zíkhna and Xánthe are being bred for aromatic leaves.

Comparative trials of pure lines showed that certain thick-leaved, deep-coloured types produced leaves of good quality despite drought. Such types are also more resistant to mosaic, the following mosaic-resistant lines being noted: BS 31, R 61b, BX 125, BX 107 x X 125(2a) and AS 80.

Studies on resistance to *Phytophthora* continued. S 56, S 57, S 2 and S 53 showed resistance to *Thielaviopsis basicola.*

American Virginia strains and hybrids between these and Greek varieties were studied for local adaptability.

Experiments on colchicine treatment are also in progress.

1364 **Tests with main flue-cured strains.**
Rhod. Tob. J. 1952 : **4** : No. 9 : 49–54.

The relative adaptability of various flue-cured tobaccos to a wide range of soil and climatic conditions was among the topics discussed at a conference of the Tobacco Research Board of Southern Rhodesia. Some indication was also given of crosses made at Trelawney to combine the disease resistance and leaf quality of different varieties already widely grown.

1365 Pogliaga, H. H.
Híbrido intergenérico "Nicotiana x Petunia." (**Intergeneric hybrid *Nicotiana* x *Petunia***).
Rev. Argent. Agron. 1952 : **19** : 171–78.

Two hybrids were obtained by crossing a Spanish hybrid tobacco, Hybrid 217 (Zaharani x Kentucky) with *P. Parodii*. Only one of the hybrids has flowered and is described. In vegetative characters it resembles the *N. Tabacum* parent but the floral characteristics are different from both parents, showing certain resemblances with some species of the subgenus *Petunioides*. The chromosome number in microsporocytes was 31, which is intermediate between the two parents, and the hybrid was completely sterile.

1366 Pogliaga, H. H.
Híbrido intergenérico *Nicotiana* x *Petunia*. (**Intergeneric hybrid *Nicotiana* x *Petunia***).
Idia 1952 : **5** : No. 57 : p. 16.

The hybrid described, *N. Tabacum* Hybrid 217 x *P. Parodii*, bore flowers which differed from those of both parents; its chromosome number of $2n = 31$ was evidently comprised of 24 from *N. Tabacum* and 7 from *P. Parodii* (cf. Abst. 1365).

1367 WELDON, T. A. and PANYALAKSHANA, P.
Sur la richesse en alcaloïdes chez les hybrides interspécifiques et les amphidiploïdes de *Nicotiana*. **(On the alkaloid content of interspecific hybrids and amphidiploids in *Nicotiana*).**
CR Soc. Biol., Paris 1946 : **140** : 724–25.

The alkaloid content of colchicine-induced amphidiploids of *N. Tabacum* x *N. glauca* and *N. Tabacum* x *N. sylvestris* was considerably higher than in the untreated hybrids, though still lower than in *N. Tabacum*.

1368 WÖBER, O.
Wege und Ziele der Tabakforschung. **(Ways and objectives in tobacco investigation).**
Fachl. Mitt. Öst. Tabakregie 1952 : **3** : 12–17.

In continuing earlier considerations of the subject (cf. *PBA*, Vol. XXII, Abst. 1310), it is pointed out that apparently uniform varieties such as Deli tobacco when transferred to unfamiliar surroundings often show sudden hereditary variation. This effect is shown to be in consonance with views of the Mičurin school, and with those of Michaelis on the interdependence of nuclear and cytoplasmic factors in determining the manifestation of hereditary properties. The views and methods of Dojmi Delupis (cf. *PBA*, Vol. XVIII, Abst. 2008) are also regarded as more realistic than those of classical Mendelism.

1369 HITIER, H. and IZARD, C.
Action combinée de la chaleur et de l'humidité sur le pouvoir germinatif des graines de *Nicotiana Tabacum* L. Obtention de mutations expérimentales. **(Combined action of heat and moisture on the germination capacity of *N. Tabacum* L. Production of experimental mutations).**
Ann. Inst. Exp. Tab. Bergerac 1952 : **1** : No. 3 : 87–99.

The effects of moisture and temperatures of 45° to 65° C upon germination capacity are recorded. Experiments showed that heat treatment of dormant seeds induced mutation, though the mutation rate was probably lower than that recorded by Kostoff and Sarana (cf. *PBA*, Vol. IX, Abst. 1323) for young plants. The mutations bore a general resemblance to those recorded in plants raised from aged seed or in normal seedlings after treatment with extracts from prematurely aged seeds (cf. *PBA*, Vol. XXII, Abst. 1314).

1370 HITIER, H. and IZARD, C.
Contribution a l'étude de l'action mutagène de l'essence de moutarde. Essais sur *N. Tabacum* L. et *Allium Cepa* L. **(A contribution to the study of the mutagenic action of mustard oil. Experiments on *N. Tabacum* and *A. Cepa* L.).**
Ann. Inst. Exp. Tab. Bergerac 1952 : **1** : No. 3 : 101–16.

Treatment of young tobacco seedlings and of onion roots with allyl isothiocyanate induced polyploid forms exhibiting structural changes in the chromosomes or diploid forms with structural modifications of the chromosomes.

1371 CURCIO, M.
I fattori di produzione del tabacco. **(Yield factors in tobacco).**
Tabacco, Roma 1952 : **56** : 246–60.

The role of hereditary and environmental factors affecting yield and quality in tobacco is considered with special reference to the practice of selection and crossing to obtain new varieties. In introducing a variety into a new region vigorous selection must be carried out in the locality to ensure that the variety is adapted to the environment.

1372 IZARD, C.
Étude des tumeurs spontanées de certains hybrides interspécifiques de *Nicotiana*. **(A study of the spontaneous tumours of certain interspecific hybrids of *Nicotiana*).**
Ann. Inst. Exp. Tab. Bergerac 1952 : **1** : No. 3 : 15–44.

A cytogenetic study of *Nicotiana* hybrids involving *N. glauca*, *N. Langsdorffii*, *N. paniculata*, *N. suaveolens*, *N. rustica*, *N. longiflora* and *N. Sanderae* confirmed the conclusions of Kostoff (cf. *PBA*, Vol. XVI, p. 374) and Kehr (cf. *PBA*, Vol. XXI, Abst. 2901) regarding the genetic origin of spontaneous tumours in certain hybrids.

Amphidiploids, which flower later than the corresponding simple hybrids, also produce their tumours later. Apparently, processes related to flowering play an important role in inducing tumour formation.

Neoplastic nuclei seem to differ from normal ones by an excess of heterochromatin, probably as a result of a change in the polygenes localized in certain heterochromatic chromosome segments. Mitotic anomalies are more frequent and more pronounced in neoplastic tissues.

Tumour formation was unaltered by heteroauxins, sulphanilamide, vitamin C or estrogens.

1373 Mihaĭlova, P. V.
(Selective fertilization of tobacco and the types of mutual interaction between the pollen and the tissues of the pistil).
Bjull. Mosk. Obšč. Ispyt. Prirod. (Bull. Moscow Soc. Nat.) 1951 : **56** : No. 5 : 70–78. [Russian].

The effects of the same mixed pollen of two varieties upon different female parents and of pollen in different combinations of two varieties upon the same female parent have been investigated. The experimental material included multiparental crosses involving Dubec 44, American 572, Trebizond Beregovoĭ 1272, Samsun 57, Kabot 975, Havanna 1744, Maryland 1460 and Odarama 1801.

In most cases the female parents preferred the pollen of one variety to that of the other. Moreover pollen inefficacious in some crosses was potent in others. For instance, Kabot 975, Dubec 44 and Maryland 1460 female plants gave a higher percentage of offspring of the Maryland 1460 type when pollinated with Dubec 44 + Maryland 1460, while Havanna 1744 tended to produce hybrids of the Dubec 44 type when the same pollen mixture was used. It is concluded that the same pollen mixtures produce different effects upon different female parents, and hence that the process of selective fertilization is not determined by the varietal properties of the pollen alone, but by the mutual interaction between the pollen tubes and the pistil, and, at a later phase of fertilization, by mutual interaction between the gametes.

1374 Fardy, A., Cuzin, J. and Schwartz, D.
Greffes de demi-embryons de *Nicotiana* sur plantules et sujets adultes. **(Grafts of half-embryos of *Nicotiana* on young plants and adult stocks).**
Ann. Inst. Exp. Tab. Bergerac 1952 : **1** : No. 3 : 133–37.

Using the same technique as in previous work (cf. *PBA*, Vol. XXII, Abst. 1320), the authors found that cotyledonary half-embryo grafts of *N. Tabacum* and of *N. rustica* were successful on young or adult plants of the same two species, or even on species of the related genera *Petunia* or *Datura*.

Half-embryo grafts of radicle tissue of *N. Tabacum* and *N. rustica* were also successful on stem sections of *N. Tabacum* and *N. rustica* seedlings. Some of the resultant anomalies observed suggest that the effect of the stock on the scion is not only physiological, but also morphological; for example, plumules appeared to develop from the radicle.

1375 Wolf, F. A. and Sharp, D. G.
Hereditary abnormalities in tobacco.
J. Elisha Mitchell Sci. Soc. 1952 : **68** : 85–92.

An abnormality called ruffles and another known as toad skin are described. In both disorders, leaf enations are developed, on the dorsal surface in ruffles and ventrally in toad skin. Hybridization tests have indicated that both abnormalities are inherited, ruffles behaving as a dominant character and toad skin as a recessive.

1376 Bolsunov, I.
Versuchsanbau und Züchtung nikotinreicher Tabake in Österreich und deren Aussichten auf Nikotingewinnung. **(Testing and breeding high-nicotine tobaccos in Austria and their promise for nicotine production).**
Fachl. Mitt. Öst. Tabakregie 1952 : **2** : 3–9; **3** : 7–11.

The various factors which lead to high alkaloid content in tobacco are enumerated and reference is made to experiments in Austria with a number of varieties of *Nicotiana rustica*, in which the author's tetraploid hybrid 471 (Colubi x Stemas) gave nicotine contents of up to 14% in the best year, 1950, when yields of nicotine corresponding to 170–195 kg. per ha. were obtained. In 1951 the yields varied from 104 to 114 kg. per ha. in the best varieties. Reference is made to results obtained in other countries in attempts to grow varieties of *N. rustica* with high nicotine content, including some of those produced by the author.

1377 Patče, L.
(An economic and geographical review of tobacco production in the world at large and with us).
God. Zborn. Zemjod.-Šumarsk. Fak. Univ. Skopje Zemjod. (Ann. Rep. Agron. Sylvic. Fac. Univ. Skopje Agron.) 1951 : **2** : 1–56. [Macedonian].

Some improvements in the Macedonian tobacco growing industry, including introduction of Virginia types to some districts and more extensive cultivation of the aromatic variety Prilep and the good quality filler type Otlja in others, are advocated.

1378 Akehurst, B. C.
Varieties of Turkish tobacco tested in the Colony.
Rhod. Tob. J. 1952 : **4** : No. 10 : 43–45.

At the recent conference of Tobacco Research

Workers of Southern Rhodesia, details were given of the performance of six types of Turkish tobacco on different soils in the colony. Soulouk outyields all other types, but there is evidence that some improvement can be obtained by selection from local stocks of this type which comprise a mixture of strains.

1379 CLAYTON, E. E.
Control of tobacco diseases through resistance—1912 to 1952.
Phytopathology 1952 : **42** : p. 482. (Abst.).

Tobacco breeding for disease resistance in Wisconsin during the period is briefly surveyed. In the last decade progress has been made in combining factors for resistance to two or more diseases in one variety. The results suggest that disease resistance in tobacco can be considerably improved by the introduction of genes from at least five other species of *Nicotiana*, without adversely affecting other plant characters.

1380 BOLSUNOV, I.
Field test records results of poor weather on burley tobacco seedlings.
Tobacco 1952 : **135** : No. 16 : 4–5.

Data are presented on the percentage of seedlings of burley varieties surviving the cold rainy weather experienced at the Austrian Tobacco Breeding Station in 1951. Two new varieties, Burley Titan and Bolsunov's Burley, have strong, fast-growing seedlings as tolerant of bad weather as the standard Sabolz, noted for its hardiness and vigour.

1381 MOORE, E. L., LUCAS, G. B. and CLAYTON, E. E.
Granville wilt and black shank resistant tobacco varieties.
Bull. N.C. Agric. Exp. Sta. 1952 : No. 378 : Pp. 18.

The programme of breeding for resistance to Granville wilt (*Pseudomonas solanacearum*) and black shank (*Phytophthora parasitica* var. *Nicotianae*) at the North Carolina Agricultural Experiment Station is outlined, with special reference to the release of Dixie Bright 27, Dixie Bright 101 and Dixie Bright 102 (cf. *PBA*, Vol. XX, Abst. 2514).

1382 BOLTON, A.
Progress in development of mosaic-resistant tobacco.
Rhod. Tob. J. 1952 : **4** : No. 9 : p. 91.

A number of promising mosaic resistant lines of flue-cured tobacco, well-suited to local conditions, have been developed at Trelawney, Southern Rhodesia, by crossing the susceptible Bonanza with *Nicotiana glutinosa*; many of the desirable qualities of Bonanza have been recovered by repeated back crosses, while the high degree of resistance derived from *N. glutinosa* has been maintained. Similar attempts to derive mosaic resistance from Ambalema were less successful; excessive height and poor quality were still apparent after numerous back crosses to Bonanza.

1383 TERNOVSKIĬ, M. F.
(Changes in degree of resistance to tobacco mosaic due to vegetative hybridization).
Dokl. Akad. Nauk. SSSR (Rep. USSR Acad. Sci.) 1951 : **79** : 517–20. [Russian].

Immunity from tobacco mosaic was transmitted to a tobacco variety, Trebizond KV, normally susceptible to the disease, by grafting at the USSR Tobacco Institute. The scion was grafted when it reached the fourth leaf stage on a 70 cm. tall plant of Alma Ata 315, a variety immune from mosaic. The percentage of immune types that segregated in the second seed generation was high, but the numbers of the immune and susceptible segregates varied with each family. Most individuals immune from mosaic were derived from plants which had shown the most marked signs of immunity in infection trials in the first seed generation. Of the 60 families which were immune in the second generation, 11 remained immune in the later generations.

1384 **Annual Report of the Tocklai Experimental Station, Indian Tea Association for 1951** : Pp. 36.

Further attempts to correlate quality with morphological characteristics (cf. *PBA*, Vol. XXII, Abst. 1331) have shown that plants with fragrantly aromatic flowers produce tea of a distinctive flavour. Crosses between such clones have resulted in hybrids possessing a desirable aroma characteristic of certain Darjeeling strains.

In connexion with the Nanda Devi breeding programme, hybrids with the flavour of Darjeeling leaf have been developed; they resemble strains well suited to the Darjeeling district but grow more vigorously. Crosses between clones of the *assamica* type with a high degree of pubescence have produced offspring of very good quality. Since the parent clones were similar, the offspring show a decrease in vigour characteristic of inbreds. Further inbreeding is in progress to improve leaf quality, as it will be possible to restore vigour eventually by hybridization with another unrelated inbred.

1385 Huysmans, C. P.
Bestrijding van blisterblight (*Exobasidium vexans*) in thee op Sumatra. [**Control of blister blight** (***E. vexans***) **in tea in Sumatra**].
Bergcultures 1952 : **21** : 419–64.

Resistance can only be determined reliably directly after pruning in the wet season. No resistant bushes have been found yet in Sumatra, where no new plantations are being laid down; but in Java, where tea is being planted, the above test can be used and resistant plants multiplied by grafting on young stocks. No indications of the occurrence of new races of *Exobasidium* have been found.

1386 **Research. I. Botany.**
Bull. Res. Dept. Ind. Coffee Bd. 1950–51 : No. 4 : 2–9.

At Balehonnur breeding continued with the aim of finding the best combinations of individual parents of *Coffea arabica*. At Chethalli the policy of raising foundation stocks of breeding material obtained mainly from Balehonnur was pursued; observations on the 1949 and 1950 plantings of several groups of selections are given. Promising Devamachi hybrids from crosses between *C. arabica* and *C. robusta* are under investigation at Balehonnur. An analysis of clonal selections of S 26 and S 31 supported the previous conclusion that production of various grades of beans is the result of seasonal factors. A search is being made for promising selections of *C. arabica* and *C. robusta* on private estates. At Chethalli, direct and reciprocal crosses of *C. robusta* selections were studied.

1387 Ramírez Bermúdez, J.
El Instituto Agronómico de Campinas y fitotecnia aplicada en el mejoramiento del café. (**The Agronomical Institute at Campinas and plant breeding applied to coffee improvement**).
Relac.-Tesis Min. Agric. Guatemala 1951 : Pp. 133.

A general description is given in Spanish of coffee cultivation in Brazil, and of the Campinas institute, its development, achievements and present activities in relation to coffee improvement. Extensive collections of local and introduced material of *Coffea arabica* are maintained, botanical and cytological descriptions of it have been published, as well as studies on the floral biology, the technique of crossing and the method and results of colchicine treatment, the development of the embryo and nature of the endosperm, special peculiarities such as *C. arabica* var. *monosperma*, the sterility of certain species and hybrids, polyembryony true and false, and various characters associated with polyploidy. Genetical studies have been carried out on the botanical varieties of *C. arabica* and certain other species and mutants. Over 30,000 plants have been studied for breeding purposes, those of the Bourbon variety having given the best results; the best are being used for seed production, and some 3000 kg. of élite seed is being distributed annually; line C–44 of Bourbon is resistant to die-back and frost, and other selections suitable for the different zones of the state of São Paulo are available. Brief mention is made of certain characters of practical interest found in other varieties.

1388 Blattný, C. and Osvald, V.
Příspěvek k urychlenému šlechtění chmele. (**The question of quicker hop breeding**).
Sborn. Českosl. Akad. Zeměd. 1952 : **25** : 347–48.

Methods of selecting male and female plants and red and green pigmented types at an early stage are being investigated at the Žatec Hop Institute and the Prague Biological Institute. At present the seed is sown in the glasshouse in February and the male plants are identified by their inflorescences in the summer in the outdoor nursery, to which the material is transplanted in boxes. Selection of red and green types is done when the plants are 2–3 weeks old and have put out the first and second leaves. After this stage the characteristic pigmentation disappears until summer. Intermediate types cannot be determined by this method.

1389 Golubinskiĭ, I. N.
(**A higher degree of immunity of the hop to *Peronospora* as a result of vegetative hybridization**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 73–74. [Russian].

At the Sarnenskaja Research Station, a high degree of resistance to *Peronospora* was transmitted to clone 8 when grafted on Serebrjanka [Silver], which carries resistance to mildew. Clone 8 was selected at the Žitomir Hop Station for its productiveness, resistance to drought, compact cone and high humulin content. However, it was highly susceptible to mildew.

MINOR CROP PLANTS

1390 KENDRICK, J. B. (JUN.) and MIDDLETON, J. T.

Influence of variety, temperature and fungus strains upon *Verticillium* wilt of pepper.

Phytopathology 1952: **42**: p. 515. (Abst.).

Among the seven pepper varieties studied, Anaheim Chili and Hungarian Paprika showed the greatest and Oakview Wonder the least susceptibility to *V. alboatrum*. No commercial variety was sufficiently tolerant to be grown successfully on infected soil. Optimum temperatures for expression of the disease ranged from 25 to 30° C for all varieties. Of the 12 isolates from different hosts, only the one from pepper incited severe symptoms.

1391 Memoria de la primera reunión de maní y girasol, realizada en la Est. Exp. de Manfredi 31 de agosto y 1°. de septiembre de 1950. (**Report of the first meeting on groundnut and sunflower, held at the Manfredi Experimental Station on 31 August and 1 September 1950**). Minist. Agric. Ganad. Nación. Argentina 1950 : Pp. 163. (Mimeographed).

The following papers of interest to plant breeders were read at the meeting:—

Krapovickas, A. and Rigoni, V. A. Observaciones citológicas y genéticas en Arachis. (*Cytological and genetical observations on* Arachis). (*pp. 5–6*).

A. pusilla is the only wild species so far found to have the same chromosome number, $2n = 40$, as *A. hypogaea*. In *A. villosa* var. *tipica* $2n = 20$. Crosses of *A. villosa* var. *correntina* with *A. hypogaea* gave sterile F_1 hybrids, with 30 chromosomes, which at meiosis showed a certain affinity to exist between the genomes of the two species.

A colour inhibiting gene was shown to be present in the variety Guaycurá [Indian] from Misiones. The Bolivian groundnut with striped coloured seeds was crossed with a pale-seeded form, which showed the colour and the striping each to be conditioned by partially dominant genes.

Rigoni, V. A. Técnica empleada para efectuar hibridaciones con maní en Manfredi. (*Technique used for carrying out hybridizations with groundnut at Manfredi*). (*pp. 7–9*).

Reference is made to the technique described by Stokes and Hull (cf. *PBA*, Vol. I, Abst. 419) and Umen (cf. *PBA*, Vol. V, Abst. 169). At Manfredi emasculations can be performed from 8 p.m. on, and pollination from 8 to 10 a.m. the following day. An average set of 42% is obtained.

Rigoni, V. A. Mejoramiento del maní en Manfredi (*Groundnut breeding at Manfredi*). (*pp. 21–33*).

The most commonly grown type, the Colorado [Coloured] of Córdoba, is well adapted to the ecological conditions of the main groundnut growing region of Argentina, possesses very rapid early development, and produces seed of good appearance and flavour. It is however unduly prone to premature germination and to root and fruit rots, and low in yield of green matter. Individual plant selection led to a slight improvement in seed yield but not in the other respects and crosses have been made with other types. In those with Guaycurá from Misiones a certain number of defective plants occurred. A certain number of promising selections have been made from some of the other crosses; also by selection within the variety Macspan obtained from Australia, and in hybrid material of runner types obtained from Florida, particularly Fla. 88–4–1.

Rigoni, V. A. "Blanco Manfredi," nueva variedad de maní obtenida por la Estación Experimental de Manfredi. (*Manfredi White, a new groundnut variety produced by the Manfredi Experimental Station*). (*pp. 35–38*).

Selection in the variety Macspan obtained from Australia has led to the production of a white-seeded variety Blanco Manfredi, which in seed yield is superior to the common variety Colorado from Córdoba and equal to Blanco from Santa Fé; in yield of hay and oil content it has exceeded both. The fruits are formed compactly at the base of the plant and are well attached to the gynophore, so that harvesting is easier; it is also less prone to premature germination than the Colorado type and is more resistant to root and fruit rots and virus diseases.

Cisneros, A. Bibliografía anotada sobre maní (Arachis hypogaea *L.*). [*Annotated bibliography on groundnut* (A. hypogaea *L.*)]. (*pp. 99–125*).

A list of 244 works dealing with groundnut is presented, the titles being arranged in alphabetical order of the authors. For a few of them brief summaries of the contents are provided.

Comportamiento de variedades y consejos de siembra. (*Behaviour of varieties and advice for sowing*). (*pp. 128–29*).

The Klein varieties and La Previsión 9 gave distinctly better yields than Russian sunflowers introduced from Saratov.

Mejoramientao del girasol. (Sunflower improvement). (p. 131).

Attempts to apply methods analogous to those used for hybrid corn are being made at the Pergamino Experimental Station.

Rosbaco, U. F. and Rosbaco, A. M. de Material de crianza. (Breeding material). (pp. 133–34).

A beginning has been made in producing synthetic varieties in sunflower crosses. No success has been registered in producing varieties resistant to virus by crossing with wild species since the wild characteristics are transmitted intact to the progeny.

Rosbaco, U. F. and Rosbaco, A. M. de Comportamiento de variedades y consejos de siembra. (Behaviour of varieties and advice on sowing). (pp. 135–40).

The yields from the sunflower Klein exceeded those from La Previsión 9 and Saratov in two consecutive years of tests.

Ballari, C. P. Comportamiento de variedades de girasol en Pico. (Behaviour of sunflower varieties at Pico). (pp. 141–46).

The variety Klein was clearly better than La Previsión or Russian varieties.

1392 SIMURA, T.
(On flowering and fruit setting in *Sapium sebiferum*).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 197. [Japanese]. (Abst.).

Notes are given on the floral biology and date of flowering of a series of lines introduced from China.

1393 ANDERSSON, G.
Svalöfs Tenus raps. **(The Svalöf rape Tenus).**
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 381–85.

The history of this rape of Polish origin (cf. Abst. 569) is set out with details of its performance in variety trials in Sweden and Finland during 1946–51.

1394 OLSSON, G.
Undersökning av graden av korsbefruktning hos vitsenap och raps. **(An investigation of the degree of cross fertilization in white mustard and rape).**
Sverig. Utsädesfören. Tidskr. 1952 : **62** : 311–22.

Under conditions of open pollination the proportion of selfed to cross pollinated plants of rape was 2 : 1, while white mustard, on the other hand, was almost entirely (99·6%) self-pollinated.

In crosses between white and yellow flowered types of white mustard yellow proved dominant to white, with a 3 : 1 ratio in the F_2.

Vicinism in white mustard plots measuring 10 x 1·8 sq. m. amounted to 28·7%, and in 2 x 1·2 sq. m. plots to 42·6%.

Pollen from white mustard plants is distributed within a radius of about 60 cm.; very little spreads beyond one metre.

1395 MAZZANI, B.
Cruzamientos interespecíficos en *Sesamum*. **(Interspecific crosses in *Sesamum*).**
Agron. Trop., Venezuela 1952 : **2** : 15–22.

Crosses of *S. indicum* and *S. radiatum* with *S. prostratum* gave negative results, *S. indicum* x *S. radiatum* gave fruits with no seeds, *S. prostratum* x *S. indicum* or *S. radiatum* gave fruits with seeds which failed to germinate, and *S. radiatum* x *S. indicum* gave seeds of which a few germinated when the embryo was removed and cultured in a Lukey medium; they gave rise to three plants of weak growth, resembling *S. radiatum* in all characters, and bore flowers in which meiosis was regular, with $n = 32$, and the pollen fertile. The progeny of these plants also resembled *S. radiatum* but was much more vigorous. No explanation is yet available for this increase in vigour in the progeny of plants which apparently arose by diploid parthenogenesis.

Grafts of *S. prostratum* on *S. indicum* grew more vigorously than ungrafted plants.

1396 NAKHTORE, K. L.
Jangli til (wild sesame) on Adhartal Farm.
Nagpur Agric. Coll. Mag. 1951–52 : **26** : 16–17.

Wild plants of *Sesamum orientale* found on the Adhartal Government Experimental Farm, Jabalpur, exhibited a higher degree of resistance to water-logging than the cultivated form. It is suggested that these wild plants may be useful in breeding.

1397 FROLOV, P. V.
(New districts for linseed cultivation in the USSR).
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. **12** : 22–29. [Russian].

Several tall dual purpose flaxes, including Siberian, bred at Barnaul, VIR* 1650, Voronež

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* Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

1308 and VNIIMK* 5237, proved productive in trials in Siberia and Kazahstan.

1398 Hermida, E. V.
Determinación del tenor oleaginoso por percolación en pequeñas muestras de semillas de lino. (**Estimating the oil content in small samples of linseed by percolation**).
Arch. Fitotéc. Urug. 1952 : **5** : 149–54.

An apparatus is described whereby the oil is extracted by allowing the solvent to percolate through a column of material resulting from trituration of the seed with sand. The oil content is estimated gravimetrically after evaporation of the solvent and the iodine number by conversion from the refractive index of the oil. In a test with nine varieties the highest oil content was found in Charrúa with 40% of the fresh weight, followed by H2 and Repetible 117 (Wilt-resistant 117) with 38%. Charrúa also had the highest iodine number, with a value of 193.

1399 Mehta, T. R. and Mital, S. P.
Linseed breeding in Uttar Pradesh.
Agric. Anim. Husb. Uttar Pradesh 1951 : **2** : No. 4 : 8–11.

A survey is given of work on linseed improvement, begun in 1924. Recently crosses have been made of type 1193 (Jaitipur 481 x English 470) and two of its selections with local varieties grown in north-eastern Uttar Pradesh, to combine the earliness, rust resistance and good quality of the former with the high yielding ability of the latter late-maturing, small-seeded types.

Encouraging results have been obtained among the hybrid progenies, as regards yield, seed size, rust resistance and earliness. Selections are now ready for yield tests. Further crosses involving 12 of the hybrids and 11 selected types have been made, to study possible differences in combining ability and to obtain useful combinations of characters. Transgressive segregation for tallness occurred among the first batch of crosses, combined with earliness and fairly bold seed; such hybrids offer the possibility of utilization of linseed straw for fibre.

1400 Russell, W. A.
A study of the inter-relationships of seed yield, oil content and other agronomic characters with sunflower inbred lines and their top crosses.
Diss. Abstr. 1952 : **12** : No. 3959 : 347–48. (Abst.).

In both seasons of the experiment, carried out at Minnesota University, highly significant differences were found between inbreds and between top crosses for all plant characters studied and for oil percentage of the whole seed. In one season, yield of the top crosses and stalk diameter of the inbreds showed a high negative correlation. With this exception, no definite associations were found between top cross yields and inbred plant characters. The results suggested that the tester parent, Sunrise, may contain a large number of dominant or nearly dominant factors affecting combining ability. The only lines exhibiting superior combining ability in test crosses were those carrying genes complementary to those in Sunrise. Other methods, e.g. the polycross technique and use of a synthetic as tester, for the determination of general combining ability of inbreds, require investigation.

1401 Moldenhawer, K., Martynowska, J., Pawłowska, H. and Ruskówna, Z.
Badania nad pokoleniem nasiennym mieszańców wegetatywnych słonecznika z krokoszem i rzepieniem. (**Studies on seed progenies of vegetative hybrids between sunflower and safflower or *Xanthium Strumarium***).
Roczn. Nauk Rol. 1952 : **60** : 119–30.

A detailed description is given of the results obtained from the following grafts: (1) *Carthamus tinctorius* on sunflower, (2) the reciprocal of (1), and (3) sunflower on *X. Strumarium.* Seed generations were obtained from (1) and (3). It is claimed that the vegetative hybrids produced show the possibility of an influence of stock on scion and *vice versa;* for example, an increase in the quantity of foliage in plants of the first seed generation in graft (1) and a change in the colour of some of the seeds in graft (2).

1402 Kornjakov, A. P.
(**For a high sunflower yield**).
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. 7 : 64–65. [Russian].

Material in the trials at Kuĭbyšev included hybrid 9, obtained by open pollination. It was more productive than Saratov 109 and Černjanka 35.

1403 **Report of the Wattle Research Institute, University of Natal for 1951-1952. (Fourth-fifth years)**
(1952) : Pp. 75.

S_2 seedlings of green wattle (*Acacia decurrens*) showed new recessive characters, including four lethal conditions. Three of the latter each depended on a single gene pair; the fourth was determined by two pairs. Other characters found to be simple recessives were a nonlethal yellow-green leaf colour, white edge and subsequent death of the first seedling leaf, and elongation of the hypocotyl and internodes. Segregation ratios for six recessive characters are indicative of duplicate factors. This evidence, together with cytological observations, suggests that the tan wattles are secondary polyploids.

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* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

Study of F_2, back cross and open-pollinated progenies derived from F_1 *A. decurrens* x *A. mollissima* showed that inheritance of seedling leaf colour is complex; possibly cytoplasmic inheritance is involved. Other seedling characters were noted in the F_2 and open-pollinated progenies. Three families gave a 3 : 1 ratio for pale cotyledons *vs.* normal. A highly compressed type of growth behaved as a simple recessive in one family; in two others the ratio of normal : compressed did not fit either 3 : 1 or 15 : 1. Four families segregated for the recessive character of bipinnate first seedling leaf.

Crosses of *A. dealbata* x *A. mollissima*, *A. mollissima* x *A. Baileyana* and *A. dealbata* x *A. decurrens* have been effected.

Selfed and open-pollinated progenies of *A. mollissima* were compared. Selfed seedlings were much less vigorous than natural ones. Marked differences between the two types of progenies have been observed in branching habit and other morphological characters; a number of recessive leaf characters have appeared among the selfs.

Seed has been obtained from colchicine-induced tetraploids.

1404 Suzuka, O.
(Tetraploid *Datura Stramonium*. Its morphology, alkaloid content, fertility and late maturity).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 194. [Japanese]. (Abst.).

Colchicine-induced tetraploid strains of *D. Stramonium* show typical gigas characters but have less fertile pollen and a lower seed set than the diploids. The content of atropine and hyoscyamine in the leaves and seeds of the tetraploids is higher.

1405 Starý, F.
Příspěvek k farmakobotanickému výzkumu nejdůležitějších léčivých rostlin z čeledi Solanaceae. (**A pharmacobotanical study of the most important medicinal plants of the family Solanaceae**).
Sborn. Českosl. Akad. Zeměd. 1952 : **25** : 333–42.

The systematic position of the species of *Atropa*, *Scopolia*, *Hyoscyamus* and *Datura* is discussed. Alkaloid contents of the leaves of *A. pallida*, *A. Belladonna*, *H. niger*, *H. albus*, *H. aureus*, *D. quercifolia*, *D. Metel*, *D. meteloides*, *D. ceratocaula* and *D. Stramonium* var. *Tatula* were determined. A form of the latter showed promise because of the absence of spines and a high alkaloid content.

1406 Warmke, H. E.
Studies on natural pollination of *Hevea brasiliensis* in Brazil.
Science 1952 : **116** : 474–75.

Midges of the family Heleidae are the chief agents of rubber pollination in Brazil, as in Puerto Rico (cf. *PBA*, Vol. XXII, Abst. 648).

1407 Cramer, P. J. S.
Clonal seedlings.
Quart. Circ. Rubb. Res. Inst. Ceylon 1951 (1952) : **27** : Pts. 3–4 : 16–35.

A comprehensive survey is presented of the results obtained with the clonal seedling family Av. 282 of rubber in Java. The yields of seedlings and bud grafts are compared; and the seedlings are discussed in relation to the problems of selective thinning, susceptibility to brown bast and its effect upon yield, and of suitable tapping systems in relation to the incidence of brown bast.

1408 Darley, E. F. and Silverborg, S. B.
Black thread of *Hevea brasiliensis* in Liberia.
Phytopathology 1952 : **42** : 547–58.

An apparently new disease of the tapping panel of the rubber clone TK 12 observed at the Firestone Plantations, Liberia, in 1940 is shown to be a severe form of black thread, resulting from a more virulent atypical strain of *Phytophthora palmivora* than that which causes the widespread black thread symptoms. The new virulent strain, designated form 2, was also found naturally to some extent on AVROS 50, BD 5, BD 10 and Tjir. 16. All local clones proved susceptible to artificial inoculations, but BD 5 and BD 10 showed some resistance in the field.

1409 Hilton, R. N.
Bird's eye spot leaf disease of the *He vea* rubber tree caused by *Helminthosporium Heveae* Petch.
J. Rubb. Res. Inst. Malaya 1952 : **14** : 42–92.

The chapter on pathogenicity of *H. Heveae* provides an account of the physiological and anatomical changes occurring in the host cells after penetration of the fungus. No immune or resistant seedlings of *Hevea brasiliensis* have been encountered. *H. Spruceana* and *H. brasiliensis* x *H. Spruceana* are susceptible; *H. Benthamiana* is resistant but not immune.

1410 de Silva, C. A.
Yields of budded rubber and clonal seedlings in commercial tapping.
Quart. Circ. Rubb. Res. Inst. Ceylon 1951 (1952) : **27** : Pts. 3–4 : 6–11.

A detailed report is given of the yields of budded and seedling clones in trials on estates in Ceylon.

1411 Josefsson, A.
Växtförädling av gummimaskros. (**Breeding kok saghyz**).
LantbrVeckan 1951 : 117–28.

The biology and morphology of kok saghyz and the methods so far followed in breeding for high rubber content in Sweden are described. Results have been promising (cf. Abst. 167). Aims so far have been concentrated on yield of rubber, but future objectives might include larger seeds, faster growth in the germination stage and a more uniform and rapid end period of flowering.

In 1950 at Svalöf, the best line yielded 135 kg. per ha., and at Hammenhög the best strain gave 260 kg. per ha. as compared with 66 kg. from unimproved plants. In both cases the plants were raised from seed.

1412 Winkler, H.
Odlingsförsök med gummimaskros. (**Cultivation experiments with kok saghyz**).
LantbrVeckan 1951 : 129–38.

Methods used and results obtained in Sweden in the cultivation of kok saghyz are described. Seed treatment before sowing included vernalization.

Yields of 150–200 kg. per ha. of rubber may be expected from improved plants; in exceptional cases, e.g. in 1950 at Singeshult in Kronoberg, average yields of 250 kg. per ha. have been recorded from unimproved material.

FRUITS AND NUTS

1413 Sugiyama, T.
(**The present state of fruit tree breeding work in Japan**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 188. [Japanese].

Notes are given on the institutes and breeding programmes concerned with improving the apple, peach, pear, kaki, chestnut, loquat and *Citrus* fruits.

1414 Crang, A. and Sturdy, M.
A comparison of some varieties of fruit preserved by bottling, canning and freezing. Progress report II.
Rep. Agric. Hort. Res. Sta. Bristol 1951 : 193–99.

A report is given of the results of tests to determine the suitability of cherry and soft fruit varieties for bottling, canning and deep freezing.

1415 de Haas, P. G. and Schander, H.
Keimungsphysiologische Studien an Kernobst. (**Studies on the physiology of germination in pome fruits**).
Z. Pflanzenz. 1952 : **31** : 457–512.

A review is given of the literature dealing with the influence on the quality of the seedlings of such factors as genetical and cytological constitution, age of mother tree, size of seed and various environmental effects, and with the factors affecting seed germination, and methods of determining and increasing germination capacity.

Experiments with stratified seed of the apple Roter Astrachan [Red Astrahan] showed the optimum temperature for germination to be 5° C, whereas for Roter Trierer Weinapfel it was 3° C; the limits seem to lie between 2 and 5° C. Germination has been observed within the fruits of certain varieties when stored at low temperatures.

The conditions required for producing seedling rootstocks of the greatest uniformity and quality are outlined.

1416 Šaĭtan, I. M.
(**Mutual interaction between the individual components of pollen mixtures**).
Agrobiologija (Agrobiology) 1952 : No. **5** : 108–11. [Russian].

At Kiev, mutual interaction between the individual components of the following pollen mixtures promoted pollen growth: quince + apple, quince + Japanese quince, quince + pear, apricot + sweet cherry, apricot + dwarf almond, and apricot + sweet cherry + almond. Inhibitory effects upon pollen growth were observed in the mixed pollen of pear + apple, peach + apricot and peach + dwarf almond. The germination of mixed pollen of pome and stone fruits proceeded normally. The growth of the pollen tubes was variable.

1417 Odincov, V. A.
(Introductions of Mičurin varieties and valuable local types).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 11 : 24–26. [Russian].

Reference is made to a local apple variety, Rozmarin Russkiĭ [Russian Rosemary], found in the Rjazanj province. It is hardy and as productive as Koričnoe [Brown]. An apple variety of the Antonovka type, but with better keeping properties, and a hardy strain of the pear Bere Zimnjaja Mičurina [Mičurin's Winter Beurré] have been recently developed in the province of Moscow.

1418 Lesjuk, E. A.
(Valuable Mičurin varieties).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 11 : 19–21. [Russian].

Descriptions are given of the apples Voskovoe [Wax], bred by Mičurin in 1934 from Sary Sinap [Yellow Sinap] x Schafnase [Sheep Nose], and Zolotaja Osenj [Golden Autumn], which was selected at Mičurinsk more recently. The latter is a seedling of open-pollinated Beljfler-Kitaĭka [Bellefleur Chinese Crab]. It is a hardy annual bearing variety, reaching maturity in August. The fruits are cream-coloured with a thin smooth skin and white juicy flesh of good flavour.

1419 Koopmans, W.
6 nieuwe appels en 1 nieuwe peer. **(Six new apples and one new pear).**
Fruitteelt 1952 : **42** : p. 879.

The following varieties are recommended for testing by growers on a small scale: the apples Appel van Paris [Apple of Paris], Ceres, Citrine, Topaas [Topaz], Vincent, Hermien van Eibergen and the pear Poire de Lux. All the apples, which are of hybrid origin, were bred at the Horticultural Laboratory, Wageningen. The pear is a seedling from a scab resistant mother tree of Louise Bonne d'Avranches raised by H. H. Nuberg.

1420 **The New Jersey No. 1 apple.**
Hort. News, N.J. 1952 : **33** : p. 2565.

This new variety, developed from Gallia Beauty x White Winter Pearmain at the New Jersey Agricultural Experiment Station, resembles Rome but develops more colour, hangs longer on the tree and is of better eating and cooking quality.

1421 Poruckiĭ, Ju. V., Halabuda, L. P. and Alekseenko, R. D.
(Variability of anatomical and physiological characters in the progeny of vegetative hybrids as affected by external conditions).
Agrobiologija (Agrobiology) 1952 : No. **5** : 67–74. [Russian].

Heritable changes in the graft Bergamotte Reinette apple on Ukrainian Bergamotte pear were investigated at Kiev. It was found that seedlings of the graft grown from seed left in the fruits, which were stored at temperatures below 0° C, resembled pears, while those grown from stratified seed resembled apples. The dominance of both types was intensified when the young plants were trained under restricted moisture conditions. Seedlings of the apple type came into bearing in the third year and produced pear-shaped apples with greenish flesh. The fruits weighed 40 to 56 grm.

1422 Šaĭtan, I. M.
(The effect of the age of flowers upon the results of near and distant crosses in peaches and apples).
Doklady Akad. Nauk SSSR (Proc. Acad. Sci. USSR) 1951 : **78** : 1025–28. [Russian].

At Kiev, *Malus baccata* x mixed pollen of the apple varieties Sibirka [Siberian] + Antonovka + Pepin Litovskiĭ [Lithuanian Pippin] + Chinese crab and *M. baccata* x mixed pollen of the pears Limonka [Lemon] + Iljinka + Clapp's Favourite set more fruits when pollinated on the first to fifth day after the emasculation of the flowers than on the seventh or ninth day after. Similar results were obtained with the peach varieties 3441 and 485163, which were pollinated with mixed pollen of several peaches and mixed pollen of apricot, plum, cherry and *Amygdalus nana*.

1423 Tatarincev, A. S.
(Self pollination within an apple clone).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1951 : **78** : 779–82. [Russian].

In experiments with Antonovka Obyknovennaja [Common Antonovka] little or no development of the pollen grains was observed in selfed flowers. The pollen grains showed better growth when the flowers were pollinated with the pollen from other flowers of the same individual, and better still when the flowers were pollinated with mixed pollen from other trees of the same clone. It is concluded that the evidence disproves the theory of the occurrence in self pollinated material of genes determining sterility, which retard the growth of the pollen tubes.

1424 Kemmer, E. and Kirchhoff, R.-H.
Über die autovegetative Vermehrung von Apfelsorten. (**Reproduction of apple varieties on their own roots**).
Züchter 1952 : **22** : 289–98.

Experiments carried out with a number of different methods of rooting demonstrated the existence of certain varieties, such as Croncels, Joyce and Ben Davis, with a higher capacity for producing their own roots than the average, the differences being hereditary properties of the varieties and not connected with age.

1425 Kovalev, N. V. and Tupicyn, D. I.
(**Apples for industrial horticulture in the zone of the Main Turkmenian Canal**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. **10** : 14–16. [Russian].

Varieties of apple adapted to the climatic conditions of Uzbekistan are listed. They include the following early varieties developed at the Šreder Horticultural Institute: Guljandom, Renet Taškentskiĭ [Taškent Reinette], Tillja Alma, Iskander, Jubileĭnoe Šredera [Schroeder's Jubilee] and Renet Šredera [Schroeder's Reinette].

1426 Martakov, A. A.
(**New varieties of apple for making apple wines in Kazahstan**).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1952 : No. 9 : 12–14. [Russian].

Several hardy apples, which make good quality apple wines, have been bred in Kazahstan from the Chinese crab x Kuljdžinka.

1427 Johnson, J. F.
New Rome Beauty strains do well.
Agric. Gaz. N.S.W. 1952 : **63** : p. 369.

Two new strains of Rome Beauty, designated Ohio Bright Red and Washington Dark Red, have produced attractive red fruits in trials at the New England Experiment Farm, NSW; both strains are recommended for trial plantings where Rome Beauty would normally be grown.

1428 Bajpai, P. N.
Sterility in loquat.
Sci. & Cult. 1952 : **18** : 88–89.

In pollination studies at Kanpur Agricultural College, India, the loquat varieties Pale Yellow and Golden Yellow showed self incompatibility.

1429 Alderman, W. H. and Weir, T. S.
Pollination studies with stone fruits.
Tech. Bull. Univ. Minn. Agric. Exp. Sta. 1951 : No. 198 : Pp. 16.

A report is given of extensive pollination studies on native and hybrid plums, European plums of the damson and prune type, sand cherries and sand cherry hybrids, Nanking cherry (*Prunus tomentosa*) and Korean cherry (*P. japonica*).

1430 Uljaniščev, M. I.
(**Distant hybridization of apricot**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 115–17. [Russian].

At Rossošj, apricots were crossed with *Prunus Besseyi* and several varieties of plum. Two hybrids between *P. Besseyi* and the apricot have borne fruits. An apricot with fruits resembling those of Tlor Ciran has been obtained by back-crossing the F_2 of *P. Besseyi* x apricot to apricot.

1431 Vysockiĭ, K. A. and Tuz, A. S.
(**Horticulture in the zone of the Main Turkmenian Canal**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 11 : 6–9. [Russian].

Local forms of pome and stone fruits in the Horezm oasis, Uzbekistan, have been investigated. The USSR Institute of Plant Industry has selected several productive and hardy apricots which are tolerant of soil salinity. Some of these are table, others processing varieties. Other promising material includes an apple, Hozaraspskaja, which shows resistance to drought and grows well on saline soils, and a red and yellow nectarine.

1432 de Wet, A. F.
Three new canning-peach varieties.
Fmg in S. Afr. 1952 : **27** : 391–93.

An account is given of the selection and testing of the varieties Keimoes, Maluti and Tokane in South Africa. All three are of the yellow clingstone, St. Helena type, and differ mainly in time of ripening. Keimoes begins to ripen a fortnight earlier than the standard canning peach Kakamas. Maluti and Tokane ripen seven and fourteen days later than Kakamas, respectively.

1433 Lesley, J. W. and Winslow, M. M.
Peach varieties for a warm winter climate.
Circ. Calif. Agric. Exp. Sta. No. 406 : Pp. 7.

A programme of breeding to overcome prolonged dormancy caused by the comparatively warm winters of southern California has resulted in the release of Anza, Bonita, Golden State, Hermosa, Ramona, Rosy, Rubidoux, Sunglow and Ventura by the University Citrus Experiment Station, Riverside. The varieties, which are well-suited to local conditions, are briefly described.

1434 González Sicilia, E.
Variedades de agrios cultivadas en el Levante español. (**Citrus varieties cultivated in the east of Spain**).
An. Inst. Nac. Invest. Agron., Madrid 1952 : **1** : 297–315.

Descriptions of the varieties of orange, lemon and mandarins grown show how it is possible in the Valencia province alone to achieve an uninterrupted supply of fruit during the period from October to June. Special merits and defects of individual varieties are noted.

1435 Chapot, H.
Le combava, citrus de la Réunion et de Madagascar. (**The combava, a citrus fruit of Réunion and Madagascar**).
Rev. Int. Bot. Appl. 1952 : **32** : 377–85.

A botanical description, complete except for certain details regarding the flowers, is given in this discussion on the combava and its systematic status and probable hybrid origin. It appears to be related to *Citrus Hystrix*.

1436 Grant, T. J., Costa, A. S. and Moreira, S.
Variations in stem pitting on tristeza-inoculated plants of different citrus groups.
64th Annu. Mtg Fla Hort. Soc. 1951 : 42–47.

The degree of stem pitting, a condition associated with tristeza, was studied in approximately 3500 seedlings, scions and rootstocks at Campinas, Brazil. The mandarin, tangelo, Eureka lemon, seedling lemon and sour orange groups showed over 90% freedom from pitting. Trifoliate oranges and citrumelos developed no pits. Grapefruits exhibited 79% pitting. Marked varietal differences in susceptibility were noted, particularly among the sweet oranges and lemons; hybrid differences were also observed within the various groups.

1437 Childs, J. F. L.
Cachexia, a bud-transmitted disease and the manifestation of phloem symptoms in certain varieties of citrus, citrus relatives and hybrids.
6th Annu. Mtg Fla Hort. Soc. 1951 : 47–51.

Information is given on the occurrence of phloem symptoms of cachexia or xyloporosis in 59 rootstocks studied in Florida. The disease was first observed in the tangelo Orlando and is distinct from tristeza. Other varieties showing susceptibility were the mandarins and kumquats, and hybrids involving either of these groups. Several species and hybrids were free from symptoms. Sweet orange and grapefruit varieties may behave as symptomless carriers.

1438 Dijkman, M. J. and Soule, M. J. (Jun.)
A tentative method of mango selection.
6th Annu. Mtg Fla Hort. Soc. 1951 : 257–62.

Tree and fruit characteristics of importance in mango selection are listed, and methods of judging fruit qualities outlined. The possible application of techniques of improving *Hevea* and other tropical crops to mango selection and breeding is discussed. Clonal tests of the chief commercial varieties in hedge row plantings should be carried out, followed by interclonal hybridization and back-crossing. Introduction of valuable material, such as cool climate ecotypes from regions of high altitude in south-eastern Indonesia, should continue.

1439 **42nd Annual Report of the Northern Nut Growers Association 1951** : Pp. 104.

McKay, J. W. and Crane, H. L. Preliminary results from training Chinese chestnut trees to different heights of head. (pp. 22–29).

In comparison with Meiling and Nanking (cf. *PBA*, Vol. XXI, Abst. 2127) selection 7916 bears nuts at an earlier age on smaller unpruned trees; bearing is delayed by pruning in all three varieties. Selection 7916 outyields Meiling and Nanking both in weight and number of nuts. As the nuts mature very early, it is suggested that 7916 may be grown further north than other varieties.

Ward, W. B. The filbert and Persian walnut in Indiana. (pp. 29–31).

At Purdue University some 40 hybrid seedlings, developed from native hazels pollinated by types producing large nuts of good quality, have survived the winter.

Several Carpathian strains of Persian walnut have been undergoing selection for improved yield and quality; Fateley 1 bears the largest nuts of good quality, with well-formed kernels and thin shells. Seedlings from crosses with the Persian walnut were distributed for trial.

Kyhl, I. Nut growing in eastern Iowa. (*pp. 31–33*).

The performance of different varieties of walnut, heartnut, pecan, hickory and chestnut is discussed. Special reference is made to a high yielding heartnut, grown from German seed, which has been designated Goettler. The nuts resemble those of Wright and crack easily.

Magill, W. W. Status of the northern pecan. (*pp. 39–45*).

W. W. Magill led a discussion on the varieties suitable for different pecan-growing regions.

Weschcke, C. Pecans in the vicinity of St. Paul, Minnesota. (*pp. 47–49*).

The relative hardiness of varieties tested for adaptability to northern environments is discussed. Second generation seedlings raised locally from seed originally obtained from natural habitats in northern Iowa have proved extremely hardy; many flushed at the same time as local black walnuts which are well adapted to the region.

Crane, H. L. and McKay, J. W. Preliminary report on growth, flowering, and magnesium deficiency of Reed and Potomac filbert varieties. (*pp. 50–55*).

Reed and Potomac, developed at Beltsville, Md., from *Corylus americana* x *C. Avellana*, appear to be suitable for eastern conditions. Recent trials have, however, shown that both hybrids develop scorch on magnesium deficient soils. Reed is less vigorous than Potomac, shows more severe scorch and greater susceptibility to a leaf disease probably caused by *Labrella Coryli*. Both varieties flower at the same time, producing equal numbersof ♀ flowers. Reed bears fewer ♂ catkins than Potomac, but produces sufficient ♂ gametes for adequate cross pollination.

McKay, J. W. and Crane, H. L. Bunch disease of black walnut. (*pp. 56–62*).

Observations made at Beltsville, Md., indicate that the heartnut is more susceptible to the virus causing bunch disease than other *Juglans* spp. Many *J. nigra* seedlings and natural hybrids between *J. nigra* and *J. regia* have remained resistant in spite of infection among adjacent trees. It is suggested that *J. nigra* may be a symptomless carrier of the virus as some apparently resistant trees show symptoms if they are cut back severely.

O'Rourke, F. L. Symposium on nut tree propagation. (*pp. 68–78*).

In a discussion led by F. L. O'Rourke, J. W. McKay emphasized the advantages of raising Chinese chestnut seedlings from seed obtained only from mother trees of proven quality.

Chase, S. B. The 1950 Persian walnut contest. (*pp. 86–87*).

On the basis of nut quality, an unnamed selection from Webster, NY, excelled both Hansen and Jacobs (cf. *PBA*, Vol. XXI, Abst. 2128 and Vol. XXII, Abst. 2219).

McDaniel, J. C. Colby, a hardy Persian walnut for the central states. (*pp. 87–89*).

Colby, one of the productive Carpathian seedlings raised from seed collected near Cosseev, Poland, in 1934, has proved outstanding in trials at Urbana, Ill., where it has grown vigorously and survived winter temperatures of — 19° F. The nuts have thin shells and plump kernels with a rich flavour.

1440 MAURER, K. J.
Erfahrungen mit einigen deutschen und ausländischen Walnusssorten. (**Experiences with some German and foreign walnut varieties**).
Züchter 1952 : **22** : 276–84.

The Research Station for Walnut Improvement and Breeding, Geisenheim, is engaged in a survey of the characteristics and economic quality of selected walnut trees in Germany. In this paper the assessment to date of 39 German and foreign varieties is set out with illustrations.

1441 KALMYKOV, S.
(**The forests of nut trees in southern Kazahstan**).
Lesnoe Hozjaĭstvo (Forestry) 1951 : No. 1 : 44–47. [Russian].

Some of the wild walnuts found in the Bostandyk district are hardy and early types, showing resistance to drought and diseases. Jubileĭnyĭ [Jubilee], Setčatyĭ [Net], Udarnik [Shock Worker], Tonkoskorlupyĭ [Thin Shell], Rauschenbach, Kon-Saĭskiĭ, Polnojadernyĭ [Solid Kernel] and Ugamskiĭ have been selected from this material at the Bostandyk Field Experiment Station. They produce large nuts with well-developed kernels, which detach readily from the shells.

1442 PANCHAVA, A. D.
(**An experiment on vegetative hybridization between the chestnut and oak**).
Lesnoe Hozjaĭstvo (Forestry) 1951 : No. 5 : 50–51. [Russian].

At the Forestry Institute of the Georgian Academy of Sciences, embryos of *Castanea* and *Quercus Suber* were grafted on the cotyledons of *Q. iberica.* Callus development was promoted by treating the cut surfaces of the stocks with a paste prepared from ground acorns. Morphological changes occurred in the grafts of several dozen plants of *Castanea* on *Q. iberica.* One plant of *Q. Suber* on *Q. iberica* also survived.

1443 PAVLENKO, F. A.
(**New varieties of hazel**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 9 : 32–35. [Russian].

Several promising hazels, notable for hardiness and resistance to drought, pests and diseases, have been developed at the Ukrainian Institute for Field and Forest Amelioration. The initial material, which included interspecific hybrids between wild and cultivated hazels and seedlings of the latter, was trained for hardiness under arid steppe conditions. Seedlings 48, 50 and 74 produce large nuts with well-developed kernels of good consistency and flavour. The kernels of 48 have 68·2% of oil. Seedling 74 is more productive than 48 and 50 but the nuts are smaller than those of the other two varieties. Variety 80 was obtained by interspecific hybridization. It is early and produces many small nuts with thin husks and well-developed kernels. They have an oil content of 64·9% and their flavour is good.

The early varieties 57 and 59, which have similar morphological and economic properties, were obtained from crossing cultivated and wild hazel. The kernels have an oil content of 66·9% and the husk is soft and thin.

1444 KOLESNIKOV, V. A.
(**The hazels of the Crimea**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 11 : 71–72. [Russian].

Some Crimean forms of hazel are interesting because of their low husk and high oil contents. The largest nuts are borne on the Trebizond group of varieties. They weigh 4 grm. each and have a flattened globose shape. Varieties of the Kerazond and Badem types produce smaller nuts of oval and cylindrical shape, respectively.

1445 PAVLENKO, F. A.
(**Hazel hybrids for the afforestation of the steppes**).
Lesnoe Hozjaǐstvo (Forestry) 1951 : No. 4 : 85–91. [Russian].

Hybrids from direct and reciprocal crosses between *Corylus Colurna* and cultivated varieties of hazel, which have been bred at the Ukrainian Institute of Field and Forest Amelioration, are described. The material is hardy and carries resistance to drought and diseases under steppe conditions. Hybrids 18, 19 and 39 have come into bearing and produced good quality fruits. The fruits of 18 have a lower husk and a higher oil content than those of hybrid 19. Hybrid 39 has a thin husk and large kernels, with an oil content of 50·4%.

1446 THAGUŠEV, N. A.
(**For the extensive introduction of nuts**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 10 : 12–14. [Russian].

Several hazels, including hybrids 1, 2, 35, 447 and 452 bred in recent years at the Soči Research Station, are regarded as promising for the maritime districts of the Krasnodar territory.

1447 CHEVALIER, A.
Sur une variété spontanée d'amandier spéciale à l'Afrique du Nord et les hybrides d'amandier-pêcher. (**On a wild variety of almond peculiar to North Africa, and almond-peach hybrids**).
Rev. Int. Bot. Appl. 1952 : **32** : 385–90.

The author describes a new species, *Amygdalus Trabuti*, discovered growing wild in central Morocco and considers its possible relationship to some of the almond varieties grown in North Africa and Spain.

Commenting on the peach-almond hybrids of the south of France, the writer also mentions the "graft hybrid" *Amygdalo-Persica Fromenti*, which he regards as a chimera of the *Cytisus Adami* type.

1448 WILSON, E. E.
Development of bud failure in the Jordanolo variety of almond.
Phytopathology 1952 : **42** : p. 520. (Abst.).

The almond Jordanolo (Nonpareil x Harriott) is affected by bud failure. The disorder is probably nontransmissible by grafting, but is scion-perpetuated and is increased by vegetative propagation.

1449 GROFF, G. W. and LIU, S.-Y.
Describing Florida varieties of lychee.
64th Annu. Mtg Fla Hort. Soc. 1951 : 276–81.

This preliminary paper describes basic procedures recommended for a taxonomic survey of litchi varieties. Chinese introductions likely to be of value in selecting and breeding forms suitable for Florida are listed. The chief centres of origin of the litchi are briefly discussed.

1450 Frolov, P. V.
(Cultivation of *Arachis* on irrigated lands).
Sovestkaja Agronomija (Soviet Agronomy) 1952 : No. 2 : 39–49. [Russian].

The most productive varieties under Uzbek conditions are Perzuvan 46/2, bred in Azerbaĭdžan, and Taškent 32 and 112, developed in Uzbekistan. The former has the defect of producing in some seasons immature pods with nonviable seed. Taškent 32 is 5 days earlier but the pods are small and of indifferent quality. Taškent 112 is a mid-season variety with large pods. Its shortcomings are a high husk content and a weak attachment of the pods to the stalks. In the lower Volga Basin, northern Caucasus and southern Ukraine, the early varieties Stepnjak [Steppe], VNIIMK* 1657 and Adyg showed promise. Adyg produces large pods.

1451 Dharampal Singh.
Groundnut—its genetics, breeding and culture.
Tech. Bull. Dep. Econ. Bot., Uttar Pradesh 1952 : No. 5 : Pp. 29.

This general survey reviews cytological and genetical research, giving special attention to the improvement of groundnuts in different parts of India. A list of newly developed varieties with increased seed yield (cf. *PBA*, Vol. XXII, Abst. 695) includes T 25, released by Kanpur Research Farm, Uttar Pradesh. A detailed account of breeding at Kanpur shows the following main objectives: maturity within 80 days, so that the crop may be followed by a winter cereal; high yielding ability; large seed size; increased oil content; and resistance to bunchy top, *Cercospora* leaf spot, *Sclerotium* wilt and *Rhizoctonia* spp. Numerous selections have been crossed to synthesize improved lines. While carrying out cross pollination it was noted that although emasculation was done with equal care in all plants, emasculated flowers of certain varieties failed to expand fully, suggesting that some varieties are able to withstand this form of injury better than others.

1452 Baldini, E. and Guccione, G.
Osservazioni su di una razza di olivo con antere sterili. **(Observations on a variety of olive with sterile anthers).**
Ann. Sper. Agr. 1952 : **6** : 1205–16.

The biology of flowering in the variety Cerasòla (= Cirasòla) was studied. Microscopic examination showed that the anthers were sterile owing to degeneration of the sporogenous tissue with consequent failure of pollen formation. Though male sterile, Cerasòla can be successfully pollinated by Bianculidda, Terminese and Mazzara, the percentage set being 33·7, 44·2 and 45·2% respectively. Open pollinated flowers showed a higher set (48·9%), probably because, under free conditions, pollination is constantly repeated.

1453 Mort, C. H.
Fruitfulness in olives.
Agric. Gaz. N.S.W. 1952 : **63** : 371–72.

The percentage of perfect flowers was found to be positively correlated with fruit set at the Wagga Agricultural Experiment Station, NSW. A high degree of self fertility was observed.

1454 Baldini, E. and Scaramuzzi, F.
Sul valore dei dati biometrici nella descrizione e classificazione delle razze di olivo in coltura. Ricerche sulle razze coltivate in provincia di Firenze. **(On the value of biometric data in the description and classification of the olive varieties in cultivation. Research on the varieties cultivated in the province of Florence).**
Ann. Sper. Agr. 1952 : **6** : 1597–1636.

Biometric observations on the leaves, fruits and stones of 15 varieties during 1949–51 showed that the individual characters might exhibit greater variation within a variety than between different varieties. Hence such observations cannot have conclusive diagnostic value.

1455 Rizet, G.
Contribution à l'étude biologique et cytologique de l'*Actinidia chinensis*. **(Contribution to the biology and cytology of *A. chinensis*).**
CR Soc. Biol., Paris 1945 : **139** : 140–42

A description of the floral biology and course of meiosis of *A. chinensis* is given. The chromosome number was too high for counting with certainty.

1456 **California Avocado Society 1951 Yearbook** : Pp. 224.

Report of the Avocado Variety Committee. (pp. 21–23).

A list of varieties suitable for particular areas resembles lists of previous years (cf. *PBA*, Vol. XXII, Abst. 703), with the exception of the exclusion of Nabal and the recommendation of Rincon for coastal districts of Santa Barbara and Ventura.

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* Vsesojuznyĭ Naučno-Issledovateljskiĭ Institut Masličnyh Kuljtur [USSR Scientific Research Institute of Oil Plants].

Winslow, M. M. Avocado variety trials at Riverside. (pp. 25–27).

Brief descriptions are given of Duke, Emerald, Hass and Zutano, which have shown promise in recent trials.

Avocado variety catalog. (pp. 28–32).

Varieties omitted from the 1950 check list and varieties registered during 1951 are listed.

Report of the Committee on Foreign Exploration. (pp. 35–40).

The wild avocado of Aquila (*Persea floccosa*), previously reported to be immune from *Phytophthora Cinnamomi* at the Citrus Experiment Station, Riverside, has shown susceptibility to recent inoculations. The rate of decline following infection is, however, slower than in Californian varieties.

Report of the Subtropical Fruit Varieties Committee. (pp. 43–46).

Two *Macadamia* seedling selections with agronomically desirable characters have been named Santa Ana and Hall, respectively, prior to commercial propagation.

Hodgson, R. W. The principal work of the Division of Subtropical Horticulture on the Avocado. (pp. 53–57).

Work in progress at Los Angeles to develop good quality varieties which bear fruit annually has included (1) crosses involving Fuerte pollen on strains of superior bearing behaviour, (2) crosses between other varieties possessing desirable qualities, and (3) analyses of open-pollinated and self-pollinated seedling progenies.

Delphey, C. C. The avocado picture in Ventura county. (pp. 63–66).

A survey is given of adaptability trials of varieties at different centres.

Halma, F. F. and Smoyer, K. M. Cold-hardiness of young avocado trees on Mexican and Guatemalan rootstocks. (pp. 75–78).

Young Fuerte trees on frost resistant Mexican and frost susceptible Guatemalan rootstocks were equally damaged by low temperatures in Santa Barbara.

Schroeder, C. A. Avocado materials for horticultural research. (pp. 107–12).

Persea nubigena, *P. longipes*, *P. indica*, *P. floccosa*, *P. Schiedeana*, *P. Lingue* and *P. Borbonia* may be incorporated in the programme of avocado improvement as they have shown relative cold hardiness, resistance to *Phytophthora Cinnamomi*, and compatibility with avocado in respect of cross pollination and grafting, in tests at the University of California.

Halma, F. F. and White, F. A. Relative susceptibility of avocado rootstocks to chlorosis. (pp. 153–56).

At nurseries in Santa Barbara, Guatemalan varieties have proved highly susceptible to a form of chlorosis, the cause of which is unknown, whereas adjacent Mexican varieties remained unaffected.

Zentmyer, G. A. and Schroeder, C. A. Research on rootstocks resistant to avocado root rot. (pp. 157–58).

In greenhouse and field trials at Los Angeles and Riverside, *Persea longipes* and *P. Lingue* showed severe root rot symptoms but other *Persea* spp. appear to be more resistant than commercial avocado.

Bringhurst, R. S. Influence of glasshouse conditions on flower behavior of Hass and Anaheim avocados. (pp. 164–68).

It was found that as a result of bringing both Hass and Anaheim plants, grown outside at 50° F, into the greenhouse kept at 65° F during the night, the time of flower opening was advanced so that the stigmas were receptive at midday. Pollination was thus effected earlier and the percentage fruit set was increased.

Lesley, J. W. and Bringhurst, R. S. Environmental conditions affecting pollination of avocados. (pp. 169–73).

Observations made at Riverside and Los Angeles have shown a marked correlation between temperature and flowering behaviour in Fuerte, Hass, Emerald, Zutano and Ryan. When maximum temperatures reached 92° F, stage I flowers were produced at midafternoon, but with a maximum of 69° F, stage I flowers were only found occasionally in the evening, too late for efficient cross pollination.
Honey bees, the usual pollinators, are also adversely affected by low temperatures.

1457 BEIJERINCK, W. and TER PELKWIJK, A. J.

Rubi in the northeastern part of the Netherlands.

Acta Bot. Neerl. 1952 : **1** : 325–60.

Study of the *Rubus* flora in the Drenthe district has so far resulted in the recognition of 46 members of the section *Moriferi*, representing species complexes and subspecies in the subsections *Suberecti*, *Sylvatici*, *Discolores* and *Appendiculati*. Information is given on their distribution in this district and elsewhere in the Netherlands. The *Rubus* flora of the district is also compared with that of surrounding countries. It appears to be most closely related to that of northwestern Germany, but also contains several North Atlantic elements.

1458 CADMAN, C. H.
Studies in *Rubus* virus diseases. IV. Yellows diseases of raspberries.
Ann. Appl. Biol. 1952 : **39** : 495–500.

It is considered that mild and severe yellows of Norfolk Giant are caused by related strains of one virus. Certain varieties, notably Devon and Lloyd George, are particularly susceptible to the strain causing severe yellows on Norfolk Giant.

1459 CADMAN, C. H.
Studies in *Rubus* virus diseases. V. Experiments in the analysis of Lloyd George decline.
Ann. Appl. Biol. 1952 : **39** : 501–08.

Scottish stocks of Lloyd George showing a symptomless decline were found to be infected with a virus complex comprising mild yellows and at least two others. One of the latter, raspberry leaf spot virus, produces distinctive symptoms on Norfolk Giant, Baumforth's Seedling B and Burnetholm Seedling but is carried without symptoms by many European and North American varieties.

1460 CHRIST, E. G.
Strawberry and blackberry released for 1953 planting.
Hort. News, N.J. 1952 : **33** : 2558, 2567.

The blackberry New Jersey 16 (Evergreen x Eldorado), and a late-ripening strawberry, New Jersey 7A, derived from crosses involving Lupton, Aberdeen, Pathfinder and Fairfax, are of sufficient vigour, productiveness and quality to be released to growers. Both were developed at the New Jersey Agricultural Experiment Station.

1461 DARMER, G.
Rassenbildung bei *Hippophae rhamnoides* (Sanddorn). [**Racial structure of *H. rhamnoides* (sea buckthorn)**].
Biol. Zbl. 1947 : **66** : 166–70.

Three races of *H. rhamnoides* could be distinguished at Hiddensee on the basis of bush size and leaf dimensions, and variation was also noted in berry size, shape, colour and ascorbic acid content. The large-leaved race had $2n = 24$, the small-leaved race $2n = 12$ chromosomes.

1462 **Successful horticultural experiments in Hungary.**
Agric. News Hungary 1952 : No. **14** : 8–9. (Mimeographed).

Three new strawberry varieties have been developed at the Fertöd Experimental Farm, Sopron: Early E; Export E, bearing kidney-shaped fruits particularly suitable for transporting and canning; and Huge E, whose berries weigh from 1½ to 2 ounces each. Three lemon experimental stations have been established.

1463 BAILEY, R. M. and MURPHY, E. F.
Orland, Monmouth and Maine 55 strawberries.
Misc. Publ. Me Agric. Exp. Sta. 1952 : No. 620 : Pp. 8.

The varieties Monmouth and Orland were developed from Aberdeen x Howard 17; Maine 55 was bred from the reciprocal cross (cf. *PBA*, Vol. XXII, Abst. 1004). The three varieties have shown superiority over Howard 17 with respect to winter hardiness, vigour, yield, resistance to red core and freezing quality. Further breeding has been undertaken to combine the merits of these new varieties with the fruit firmness and quality of Sparkle and Temple.

1464 STAUDT, G.
Cytogenetische Untersuchungen an *Fragaria orientali* Los. und ihre Bedeutung für Artbildung und Geschlechtsdifferenzierung in der Gattung *Fragaria* L. (**Cytogenetical investigations on *F. orientalis* Los. and its significance in species formation and sex differentiation in the genus *Fragaria* L.**).
Z. indukt. Abstamm.- u. VererbLehre 1952 : **84** : 361–416.

Full descriptions are given of the two diploid hermaphrodite species *F. vesca* and *F. viridis*, of the diecious tetraploid *F. orientalis*, and of hybrids between them. Hybrids of *F. vesca* x *F. orientalis* all bore male flowers with a strong tendency towards hermaphroditism; all plants had $2n = 21$ and displayed the expected meiotic irregularities. In the reciprocal cross very few hybrids were obtained and all had $2n = 28$, regular meiosis and a high degree of fertility; one was female and the rest male. Heterotic hybrids were obtained from *F. viridis* x *F. orientalis*; they were triploid ($2n = 21$) and hermaphrodite, showing the usual meiotic disturbances. The reciprocal cross *F. orientalis* x *F. viridis* was much less successful and produced only diecious plants, all of which were triploid ($2n = 21$). In both sets of hybrids the maximum number of bivalents was 7, whereas up to 4 tetravalents were observed in *F. orientalis* itself; from this behaviour it is concluded that *F. orientalis* is an autopolyploid and that its genomes are homologous with that of *F. vesca*. The crosses with both *F. vesca* and *F. viridis* confirmed that *F. orientalis* is heterogametic in the female, not in the male as reported by Petrov and Tukan (cf. *PBA*, Vol. VIII, Abst. 964); a certain number of hermaphrodites and a marked excess of females occurred however in crosses between two clones of *F. orientalis*, which may be a result of polymeric inheritance of sex in this species. The *F. vesca* x *F. orientalis* hybrids formed pollen more abundantly and more regularly than the *F. viridis* x *F. orientalis* hybrids. However about 8% of the hybrid plants in this latter cross set seed, as compared with 3–5% in the *F. vesca* x *F. orientalis* cross.

1465 Jeffers, W. F. and Scott, D. H.
Significance of physiologic races of *Phytophthora fragariae* Hickman in breeding strawberries for resistance to the red stele disease.
Phytopathology 1952 : **42** : p. 468. (Abst.).

At least three races of *Ph. Fragariae* occur in Maryland. The results of tests of the reaction of strawberry varieties and selections to isolates of the fungus from England indicated that at least four races were present; one or more of these was distinct from the races found in Maryland. Combined resistance to different races has been obtained in Maryland by crossing plants resistant to single races; selections possessing composite red core resistance, good quality fruit and resistance to leaf spot, leaf scorch and powdery mildew have been distributed to growers for testing.

1466 Mellor, F. C. and Fitzpatrick, R. E.
Strawberry virus complexes.
Phytopathology 1952 : **42** : p. 516. (Abst.).

The presence of a latent virus in apparently healthy plants of the strawberries British Sovereign and Marshall was demonstrated when these varieties were indexed with *Fragaria vesca*. The data suggest that the virus exists in numerous intergrading strains, and that it is identical with the nonpersistent strains associated with Marshall yellows. When Royal Sovereign plants were inoculated with the nonpersistent strains only, no definite symptoms developed, but when also inoculated with the persistent component of Marshall yellows they showed typical symptoms of yellow edge.

1467 Mesa Bernal, D.
¿Es el banano indígena de América, o es importado? (**Is the banana indigenous to America or imported?**)
Agricultura Trop. 1952 : **8** : No. 11 : 23–27.

Evidence is cited in support of the view that *Musa paradisiaca* was cultivated in South America before the Spanish conquest.

1468 Simmonds, N. W.
Experiments on the pollination of seeded diploid bananas.
J. Genet. 1952 : **51** : 32–40.

A method is described for comparing the yield of viable seed given by different pollens on seeded diploid varieties at the Imperial College of Tropical Agriculture, Trinidad, using 22-chromosome clones of nine species from the sections *Eumusa* and *Rhodochlamys* and 20-chromosome clones of *Musa violascens*. Each nodal cluster of female flowers was treated as a block of plots to which pollen from different varieties was applied at random, the whole inflorescence forming a randomized block experiment. Differentiation between efficient and poor pollinators was particularly obvious at the intraspecific level, and gave evidence of close relationship between certain clones, supporting results obtained from taxonomic and cytogenetic investigations. Considerable variation occurred within both *M. Balbisiana* and *M. acuminata*; in the latter, the results supported the taxonomic conclusions of Cheesman (cf. *PBA*, Vol. XIX, Abst. 531). Pollination by closely related clones gave higher seed yields than self pollination, suggesting that some zygotes produced by selfing were homozygous for deleterious recessive genes and were subsequently eliminated.

1469 Dutta, S.
Some bananas of Assam.
Indian J. Hort. 1952 : **9** : No. 3 : 26–35.

Information is given on the botanical characteristics and economic significance of 19 varieties cultivated in Assam.

1470 Simmons, W. A.
Grapes for the Dakotas.
Forty-seventh and forty-eighth Annual Reports of the South Dakota State Horticultural Society for the year ending June 30, 1952 : Pp. 25.

Two hybrids, Arikara (Lady x a North Dakota wild grape) and Emana (Beta x Agawam), are being propagated for growing in the Dakotas. They have been chosen from hybrids which were originally introduced by N. E. Hansen in 1924 and whose parents were native wild grapes and improved Labrusca varieties.

1471 BERRY-SMITH, F.
Viticulture.
Bull. N.Z. Dep. Agric. 1952 : No. 354 : Pp. 72.

The bulletin includes descriptions of varieties and of hybrids between European and native American vines, regarded as suitable for growing in New Zealand for dessert or wine production.

1472 C., I.
Belle uve da tavola; incrocio Prosperi 37. (**Fine dessert grapes: the hybrid Prosperi 37**).
Riv. Vitic. 1952 : **5** : p. 312.

Bred by V. Prosperi from the cross Baresana x Regina, this new vine is characterized by vigorous growth and high productivity. The grapes are golden yellow with a tinge of pink, with a thick, but not tough skin, fleshy sweet pulp containing 2–3 seeds, and a slight muscat aroma. At Conegliano the grapes ripen in the first fortnight in September and are resistant to rot.

1473 WELLINGTON, R.
Five promising new grapes—two of them seedless.
Fm Res. 1952 : **18** : No. 4 : 12–13.

The following varieties, bred from crosses between American and European grapes, are described: Himrod and Romulus, yellow seedless varieties from Ontario x Thompson Seedless; Bath, a black dessert type, from a cross between Fredonia and Geneva 10805 (Chasselas Rose Violet x Mills); Aldew, a reddish black dessert variety (Ontario x Grosse Guillaume); and Naples, a dessert and wine red grape, resembling Delaware and developed by crossing this variety with a hybrid between Mills and Iowa. The varieties are recommended for trial in areas where the temperature does not fall below — 15° F., and where Concord ripens.

1474 STOVER, L. H.
Breeding has produced better grape varieties for Florida.
64th Annu. Mtg Fla Hort. Soc. 1951 : 269–71.

Vigorous female vines of native or F_1 hybrid origin are being used with good results. A selection from Pixiola (*Vitis Simpsonii*) x Golden Muscat has been provisionally named Lake Emerald and is being increased for experimental planting on a larger scale. It is a white, sweet, aromatic dessert grape, with uniform berry size.

1475 SEDLAČEK, J.
Zkušenosti s prováděním hromadné a individuální selekce révy vinné v Mutěnicích. (**Experiments on mass and individual selection of vines at Mutěnice**).
Sborn. Česk. Akad. Zeměd. 1952 : **25** : 449–56.

Selection work with 23 varieties at Mutěnice is described.

1476 TSUCHIYA, K.
(**Changes in the chemical composition of the berries during maturation and maturation period in some of the principal grape varieties**).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 120–25. [Japanese].

Varietal differences are noted in the flowering and maturation periods and in the water content, fresh weight, acidity and sugar content at various stages during maturation in five varieties grown in Japan.

1477 DALMASSO, G. and COSMO, I.
Indagine sui vitigni da vino coltivati in Italia. (**Investigation on wine vines cultivated in Italy**).
Suppl. Ann. Sper. Agr. 1952 : **6** : No. 5 : I–X.

Earlier international proposals for ampelographical studies and the conclusions subsequently reached are reviewed. The organization of the present enquiry is described, with some information obtained on the number of stocks in Italy and those most commonly cultivated there, on the estimated production of direct producer hybrids, and on the existence of a tendency towards the predominance of one particular variety in a province.

An appendix sets out the internationally approved schedule for descriptions of vines, with explanatory sketches.

1478 VAZ, J. T.
Identificação de castas de uva de mesa. (**Identification of varieties of dessert grapes**).
Estud. Inform. Téc. Direcç. Ger. Serv. Agríc., Lisboa 1952 : No. 38 : Pp. 26.

Detailed studies of the vines Rosaky, Dattier de Beyrouth and Waltham Cross, grown on the same rootstock and under similar conditions, have led to the conclusion that they are identical. A number of other synonyms are indicated.

1479 KATARJJAN, T. G.
(The ways of reconstruction).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 8 : 50–54. [Russian].

A brief account of research at the Magarač Institute of Viticulture and Wine Making, with notes on vine selection and yeast culture, is given. Some promising varieties and hybrids for making champagne have been selected from material found in Moldavia, the Crimea, Kazahstan, Tadžikistan, Uzbekistan and Azerbaĭdžan. A new strain of yeast, Feodosija 1–19, showing tolerance of a high degree of acidity, has been developed.

1480 KIRILLOV, F. F.
(Scientific research in viticulture).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 6 : 54–56. [Russian].

This brief account of the activities of the RSFSR Institute of Viticulture and Wine Making in 1950 and 1951 includes notes on breeding. Several hardy and early varieties, adapted to the climate in the Don country, Povolžje and the central belt of the RSFSR, such as Severnyĭ [Northern], Zarja Severa [Dawn of the North], Plotnyĭ [Compact], Mičurinite and Stepnoĭ [Steppe], have been obtained by hybridization. The methods comprised crosses between European vines, interspecific crosses and back crosses of hybrids between European vines and *Vitis amurensis* to European varieties. Some vines regarded as suitable for cultivation in the southern and central zones of screened viticulture and in the elevated plain of the Don country are listed.

1481 MIHAĬLOVA, P. V.
(Hybrid seedlings for unscreened viticulture in Central Asia).
Vinodelie Vinogradarstvo SSSR (Winemaking Viticult. USSR) 1952 : No. 9 : p. 45. [Russian].

Some promising hardy and productive hybrids, with perfect flowers, bred at the Magarač Institute are described.

Hybrid 10–3 from (Tagobi x *Vitis amurensis*) x Malingre is a midseason variety producing medium large bunches of round black grapes. They develop few seeds, have a thick skin and make a good dessert wine. Hybrid 11–1, from the same cross, produces small black grapes with a thin skin and large seeds. The fruits reach maturity in September and make a good quality dark wine. Hybrid 7–33 from Tagobi x (Tagobi x *V. amurensis*) reaches maturity in August and produces grapes with similar properties to 10–3. They are used for making dry and strong wines.

1482 BÖRNER, C.
Die ersten reblausimmunen Rebenkreuzungen. **(The first phylloxera-resistant vine crosses).**
Angew. Bot. 1943 : **23** : 126–43.

The mode of inheritance of phylloxera resistance was studied in crosses between the immune variety Cinerea Arnold on the one hand and varieties and hybrids involving *Vitis vinifera*, *V. vulpina*, *V. rupestris*, *V. Solonis*, *V. Berlandieri* and other species on the other. Resistance to phylloxera biotypes 436 and 521 was determined by 3 dominant factors, to biotypes 20 and 378 by 2 dominant factors, and to biotypes 140, 208 and 438 by 1 such factor. Resistance to biotype 943 depended on the interaction of a pair of complementary genes.

1483 STONER, W. N. and STOVER, L. H.
Field plot observations indicate that new hybrid grapes are vigorous in Florida degeneration areas.
64th Annu. Mtg Fla Hort. Soc. 1951 : 266–68.

Pixiola x Golden Muscat hybrids have remained free from degeneration (cf. Abst. 1474).

FORESTRY

1484 PAULEY, S. S.
Increasing solar energy conversion efficiency in forest trees by the application of genetics.
Proc. Amer. Acad. Arts Sci. 1951 : **79** : 221–27.

The degree to which improvements in the characteristics of forest trees can be achieved by breeding is reviewed. Particular reference is made to breeding techniques used in Sweden, including preliminary assessment of genetic variability in each geographical area, selection of phenotypically "plus" trees for hybridization, establishment of seed plantations, and evaluation of individuals by means of progeny tests. It is pointed out that the value of progenies resulting from crosses of selected parents is frequently increased by marked hybrid vigour.

1485 **Report on forest research for the year ending March, 1951. Forestry Commission, London 1952** : Pp. 139.

Edwards, M. V. Provenance studies. (pp. 38–43).

Data are presented on the characteristics of European larch of various provenance grown at Drummond Hill, Perthshire, since 1935. Scottish races are intermediate between the slender fine-branched habit of Sudetan types and the coarse-branched Alpine forms which grow more slowly and are less resistant to canker. Comparisons between the F_1, F_2 and F_3 of *Larix europea* x *L. leptolepis* show that the fine branching of the F_1 hybrid is lost in the F_3; the latter was the only generation susceptible to canker.

Analyses of open-pollinated progenies of *L. eurolepis* at Allerston Forest, Yorks., indicated that although variation is continuous, with a preponderance of Japanese types, trees with pronounced heterosis are characteristically intermediate between the original European and Japanese parents. Thus selection for vigour tends to preserve an intermediate type.

Matthews, J. D. Forest genetics. (pp. 74–82).

Beech. Seedling progenies from crosses between trees of European origin and some 40 English trees, selected with particular attention to persistence of the main axis and veneer quality of the utilizable stem, are undergoing trial. One-plus-one transplants raised from seed collected from the two finest stands in England are significantly taller than seedlings originating from two stands of poorer quality.

Corsican pine. A comparison of heights of one-year-old seedlings from 15 selected individuals is in progress. Progeny of selection 7/50 have a significantly greater mean height (2·21 ins.) than those from 23/50 (1·40 ins.); the remainder form a homogeneous group between these extremes.

Pine. A number of parent trees for use in a seed orchard were selected from remnants of the old Caledonian Forest in Wester Ross, Aberdeen and Inverness.

Sitka spruce. It has become evident from a general survey that although the development of high quality timber is influenced by environment, characters such as stem straightness, vigour, degree of branching and times of flushing and flowering are to a large extent genetically determined. There is also evidence of variation in the inherent capacity to bear seed, excessive seed set often being associated with poor vegetative growth.

Douglas fir. Variability in English stands is being investigated.

Zehetmayr, J. W. L. Persistence of late-flushing characters in Norway and Sitka spruce. (pp. 82–83).

Relative flushing dates of Norway spruce selected at an early stage have remained consistent over several years, indicating the possibility of developing a late flushing strain for frosty hollows by seedling selection in the nursery. Differences between early and late lines of Sitka spruce were also obvious but not so marked.

Peace, T. R. and Wood, R. F. Poplars and poplar cultivation. (pp. 83–87).

Varietal trials in progress in different parts of England, Scotland and Wales are listed. The scheme for distributing only certified stocks of *Populus serotina*, *P. gelrica* and *P. robusta* has prevented the importation of undesirable strains, thus reducing the spread of canker. Results of inoculation tests have established the canker susceptibility of *Populus trichocarpa,* the clones Androscoggin and Northwest A, and the hybrid *P. tremula* x *P. tremuloides.*

At the Fen Row Nursery, Rendlesham, Suffolk, only two hybrid clones, Maine and OP 19, were severely infected by *Dothichiza populea.*

Peace, T. R. Tree diseases in Great Britain, 1950–51. A general review. (pp. 94–98).

Brief reference is made to the importance of testing all poplar hybrids and selections for canker reaction, and to the progress of testing prewar stocks of elms possibly resistant to Dutch elm disease. All the Swedish polyploid elms recently tested proved very susceptible.

Hanson, H. S. Forest entomology. (pp. 98–107).

Marked variability was observed in the reaction of *Picea* spp. to *Neomyzaphis.* A few species were almost immune, suggesting ample scope for development of a resistant hybrid to replace *P. sitchensis* in certain localities.

Laing, E. V. Botanical studies of the variation in certain conifer species. (p. 135).

Data on morphological variability are almost sufficiently complete for the identification of distinct strains of European and Japanese larch. Differences noted in cotyledon structure of European and Japanese species and interspecific hybrids have suggested a method for determining whether seed is of hybrid origin.

1486 Aus der Arbeitsgemeinschaft für Forstgenetik und Forstpflanzenzüchtung. (**From the Society for Forest Genetics and Forest Tree Breeding**).
Z. Forstgen. Forstpflanzenz. 1952 : **2** : 19–23.

The third meeting of the society (cf. *PBA*, Vol. XXII, Abst. 1460) took place on 25–27 June 1952, the following papers being read:—

Barner, J. Physiologische Aufklärung an Standortrassen mit radioaktiver Isotopenmethode. (*Physiological information on environmental races with the method of radioactive isotopes*). (*p. 21*).

Radioactive isotopes were absorbed more rapidly and diffused more regularly through the tissues in drought-resistant forms of poplar, lime and *Robinia* than in susceptible forms.

Grehn, J. Das Verhalten von Populus canescens *in der Kreuzung.* (*The behaviour of* P. canescens *in crossing*). (*p. 21*).

Crosses of *P. canescens* are less successful than those of *P. tremula* and *P. alba* and the mortality rate of the hybrid populations is higher. The pollen of *P. canescens* can be distinguished from that of the other two species by diameter measurements. Studies of seed weight in the hybrids have been reported elsewhere (cf. Abst. 1493).

Illies, Z. M. Auslese von Mehrlingskeimlingen in Einzelbaumnachkommenschaften von Picea Abies. (*Selection of multiple seedlings in single plant progenies of* P. Abies). (*p. 21*).

Multiple seedlings were found in 74 out of 231 single plant progenies. In some cases both seedlings were diploid ($2n = 24$), in others one was diploid, the other, smaller one, was aneuploid ($2n = 28$–30) or triploid ($2n = 36$), or both were abnormal in germination, being in some cases fused. Triplets and quadruplets also occurred. Certain individuals showed an unusually high proportion of twinning in their progenies.

Johnsson, H. Einige Fragestellungen der forstlichen Nachkommenschaftsprüfung. (*Some problems in forest tree progeny tests*). (*p. 21*).

See Abst. 1487.

Krahl-Urban, J. Erblichkeitsprüfungen in Eichen- und Buchenbeständen. (*Inheritance tests in oak and beech plantations*). (*p. 21*).

Observations of naturally regenerated plantations involving at least one daughter generation showed the inheritance of early and late flushing, branching and crown habit, and curved growth in beeches and oaks and in crosses between *Quercus pedunculata* and *Q. sessiliflora*.

Langner, W. Die diagnostische Bedeutung eines Aurea-*Faktors bei* Picea Abies *für die genetische wirksame Pollenverbreitung.* (*The diagnostic importance of an* aurea *factor in* P. Abies *for genetically effective pollen distribution*). (*pp. 21–22*).

Trees bearing the *aurea* factor gave 1 yellow : 1 green seedling when crossed with normal green trees. The progeny of normal trees growing close to a group of trees bearing this factor had up to 20% yellow seedlings but those at a distance of 40 m. had less than 5%, showing that fertilization is effected in the main by pollen from trees in the immediate vicinity.

Meyer, H. Gegenüberstellung von feinborkigen und grobborkigen Fichtentypen in bezug auf Ästigkeit und Holzqualität. (*Comparison of fine and rough-barked spruce types in respect to knottiness and timber quality*). (*p. 22*).

In trees with fine, smooth bark 38·5% of cross sections of the wood were free from knots as opposed to 2·6% in rough-barked trees.

Querengässer, F. Bereisung nordamerikanischer Institute für Forstpflanzenzüchtung. (*Visits to North American forest tree breeding institutes*). (*p. 22*).

Examples of breeding shipmast locust, Douglas fir and various pines for improved yield and disease resistance and of promising hybrids such as those of *Populus contorta* var. *latifolia* x *P. Banksiana* are cited.

Rohmeder, E. Die Möglichkeiten einer Wachstumssteigerung bei den Baumarten Kiefer und Fichte durch das Massenausleseverfahren der frühzeitigen Pflanzengrössensortierung. (*The possibilities of increasing growth rate in pines and spruces by the mass selection method of early sorting for plant height*). (*p. 22*).

In groups of plants all arising from seed of the same size group, selection of the tallest trees in the first year or two gave rise to trees which maintained their superiority only up to a maximum of 11 years, according to the initial degree of difference. Selection according to seed size also failed to provide a suitable method of producing plus trees.

Rohmeder, M. and Dimpflmeier, R. Larix decidua *Mill. x* L. Gmelini *Pilg., ein in Grafrath mehrfach natürlich entstandener luxurierender Bastard.* (L. decidua *Mill. x* L. Gmelini *Pilg., a heterotic hybrid arising several times spontaneously at Grafrath*). (*p.* 22).

See Abst. **1504**.

Seitz, F. W. Weitere Beobachtungen am zwittrigen Aspenklon von Dillingen (Donau). [Further observations on the hermaphrodite aspen clone from Dillingen (Donau)]. (*p.* 22).

In continuation of earlier investigations (cf. *PBA*, Vol. XXII, Abst. 3013) it is reported that development seems to be normal in both male and female organs; no chromosome irregularities were observed in either embryo sac or root tips of seedlings from the clone. Size differences were observed in mitotic chromosomes.

von Wettstein, W. Prüfungen an Nachkommenschaften guter Harzbäume. (Tests on the progenies of good resin pines). (*p.* 22).

Selection for resin content can be made on 1–3 year old seedlings on the basis of the structure of the glandular epithelial cells and the degree of secretion (cf. *PBA*, Vol. XXII, Abst. 1472).

Zenke, U. Untersuchungen über die Zytologie der Pseudotsuga taxifolia. (*Investigations on the cytology of* Ps. taxifolia). (*p.* 22).

The chromosome number $2n = 26$ was confirmed and 13 typical bivalent figures were observed at diakinesis.

1487 Johnsson, H.
Einige Fragestellungen der forstlichen Nachkommenschaftsprüfung. (**Some problems in forest tree progeny tests**).
Z. Forstgen. Forstpflanzenz. 1952 : **2** : 2–8.

Questions such as size and shape of plots, number of replications, experimental design and statistical methods are discussed with reference to the special problems presented by experiments with forest trees. The advantages of incomplete blocks and split plots are expounded and it is emphasized that the *t*-test is valid only for comparisons of any two single values in an experiment. Correlations between measurements on young trees and their final performance are not sufficiently great to obviate the necessity of long-term progeny tests for the time being.

1488 Tucker, J. M.
Evolution of the Californian oak *Quercus Alvordiana*.
Evolution 1952 : **6** : 162–80.

On the basis of examination of herbarium specimens, field studies, analysis of population samples, and paleobotanical and geological data, it is concluded that *Q. Alvordiana* has arisen through interbreeding between *Q. Douglasii* and *Q. turbinella* (cf. Abst. 682).

1489 Muller, C. H.
Ecological control of hybridization in *Quercus*: a factor in the mechanism of evolution.
Evolution 1952 : **6** : 147–61.

Edaphic control of survival of hybrids between the following pairs of North American species is discussed: *Q. Mohriana* and *Q. Havardi*; *Q. Mohriana* x *Q. grisea*; *Q Mohriana* and *Q. stellata*; *Q. incana* x *Q. marilandica*; and *Q. Margaretta* x *Q. stellata*. Climatic influence upon hybridization is examined with reference to the restriction of overlapping between the ranges of *Q. Havardi* and *Q. stellata*. The low frequency of hybridization between *Q. Emoryi* and *Q. Gravesii*, and between *Q. hypoleucoides* and *Q. Gravesii*, is regarded as being due to genetic incompatibility, since neither spatial isolation nor unsuitability of sites for the growth of interspecific hybrids appears to limit hybridization in these cases. Finally, suggestions are given concerning the possible course of speciation in the *Q. Margaretta* complex.

1490 Desmarais, Y.
Dynamics of leaf variation in the sugar maples.
Brittonia, NY 1952 : **7** : 347–87.

On the basis of variation in leaf characters, *Acer Saccharum* in eastern North America is divided into six subspecies: *Saccharum, nigrum, floridanum, grandidentatum, leucoderme* and *Schneckii*. Subspp. *Saccharum* and *nigrum* are united by a cline; an intermediate population also joins subspp. *floridanum* and *grandidentatum*.

1491 Peace, T. R.
Poplars.
Bull. For. Comm., Lond. 1952 : No. 19 : Pp. 50.

Chapter I gives information on *Populus* species, varieties and hybrids suitable for Britain, an identification key of the principal poplars grown in Britain, and a succinct survey of work on the development of new hybrids in Canada, the United States, Europe and Russia.

1492 HIRAYOSHI, I.
(Some observations on the F_1 of *Populus Sieboldii* x *P. alba*).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 198–99. [Japanese]. (Abst.).

Brief allusion is made to the growth rate and morphology of saplings of the above cross.

1493 GREHN, J.
Das Samengewicht bei Kreuzungen innerhalb der Sektion *Populus Leuce* als Funktion des weiblichen und männlichen Partners. **(Seed weight in crossings within the section *P. Leuce* as a function of the male and female parents).**
Z. Forstgen. Forstpflanzenz. 1952 : **2** : 8–16.

The seed yield in various interspecific crosses within the section *Leuce* varied widely according to climatic and other conditions. An analysis of variance of seed weight in crosses of *P. canescens*, *P. alba* and *P. tremula* with *P. tremuloides*, *P. grandidentata*, *P. tremula*, *P. canescens* and *P. alba* showed that the values are significantly more influenced by the female parent than by the male.

1494 PAULEY, S. S.
Photoperiodic growth response in *Populus*.
Genetics 1952 : **37** : p. 613. (Abst.).

Studies of ecotypic variability in *Populus* spp. have indicated that day length has an important influence upon the annual termination of growth activity. Long-day ecotypes native to northern latitudes consistently show an abnormally early dormancy when grown in the shorter days of southern latitudes, although otherwise favourable growing conditions may persist for several months. Conversely, short-day ecotypes native to southern latitudes, when grown in northern regions, fail to stop growth before the first frosts. Hybrids from crosses between southern and northern ecotypes terminate annual growth at times intermediate between the dormancy dates of the parents when grown together in the same day length. Exceptions to this general behaviour are shown by *P. tremuloides* ecotypes from high altitudes with a short growing season such as those native to the short-day regions of the central and southern Rocky Mountains. When transplanted to the latitude of Boston, Mass., these ecotypes show an early termination of seasonal growth, comparable with that of ecotypes from the long day conditions of high latitudes. The possible role of this adaptability to the short season of high altitudes in the migration of *P. tremuloides* is discussed.

1495 GUINIER.
La question du peuplier dans le monde. **(The question of the poplar throughout the world).**
CR Acad. Agric. Fr. 1952 : **39** : 435–40.

The work of the International Committee on the Poplar is outlined with special reference to the geographical distribution of the three main botanical groups of poplars of interest for cultivation. Poplar hybrids and the improvement of cultural methods are mentioned.

1496 MURRAY, J. S.
Recent research on forest pathology in Holland.
Quart. J. For. 1953 : **47** : 41–47.

An account is included of tests of *Populus* spp. and hybrids for resistance to bacterial canker, *Nectria* and *Melampsora*, and of *Ulmus* spp. and hybrids for resistance to Dutch elm disease and *Nectria*. Elm breeding for disease resistance is in progress, using Asiatic species, and two varieties of *U. carpinifolia*, Christine Buisman and Bea Schwarz.

1497 DENGLER, H. W.
Evaluate Asiatic chestnuts for blight resistance.
Amer. Nurserym. 1952 : **96** : No. 8 : 10, 77.

The article deals chiefly with an experimental planting in the Mount Alto state forest, Adams county, Pa. Some specimens are proving superior in blight resistance, growth rate, productivity and form in Pennsylvania and other states.

1498 FROILAND, S. G.
The biological status of *Betula andrewsii* A. Nels.
Evolution 1952 : **6** : 268–82.

The results of an analysis of the morphological variation in a population of *B. Andrewsii* in Colorado, using the polygonal graph and hybrid index methods, are presented. They support the hypothesis that *B. Andrewsii* consists of a hybrid swarm originating from natural hybridization between *B. occidentalis* and *B. papyrifera*.

1499 JENTYS-SZAFEROWA, J.
Analysis of the collective species *Betula alba* L., on the basis of leaf measurements. Part III. *Betula oycoviensis* Bess. and *Betula obscura* Kotula. Determination on the basis of a single leaf.
Bull. Acad. Polon. Sci. Lettres, Cracovie 1951 (1952) : Sér. B : No. 1–3 : 1–40.

The author concludes her biometric analysis of the leaf characters of members of the species complex *B. alba* (cf. *PBA*, Vol. XXI, Abst. 1380, and Vol. XXII, Abst. 1467) with a study of *B. oycoviensis* and *B. obscura*, species endemic to Poland. The leaf characters of *B. oycoviensis* are distinct from those of *B. verrucosa*; additional proof has therefore been obtained that the former is a separate and well-defined species. *B. obscura* resembles *B. verrucosa* in leaf shape, and shows a similar local variability; it can be equally well classified as a small species or variety of *B. verrucosa*.

If two birch species are compared as to leaf shape on the basis of the arithmetic means of the characters measured, and one of the species is represented as a straight line, then the other species is represented as a characteristic zigzag line, termed the line of shape and size of the second species. Lines of shape and size based upon single leaf data only have been found to be characteristic. Tables are given to facilitate the drawing of single leaf lines of *Betula*. The general application of the method of lines of shape in taxonomy is discussed.

1500 ANDRONOV, N. M.
(Practical importance to forestry of the species concept in the light of academician T. D. Lysenko's theory).
Lesnoe Hozjaĭstvo (Forestry) 1951 : No. 8 : 18–20. [Russian].

In the Mičurinite view, competition occurs between different species of *Ulmus*, but not between taxonomic units of a lower order. Mixed sowing of different species must be avoided.

1501 KARAPETJAN, S. K.
(A hazel originating from a hornbeam).
Agrobiologija (Agrobiology) 1952 : No. 5 : 23–29. [Russian].

In Armenia, a 70 year old hornbeam tree, *Carpinus caucasica*, was found to bear a branch of hazel, *Corylus Avellana*. The branch was about 20 years old and grew on the trunk 3 m. above the ground. It had smaller leaves than normal hazels. The phenomenon is explained by Lysenko's theory of interspecific conversion (cf. *PBA*, Vol. XXI, Abst. 2500).

1502 MÉNAGER, H.
Les *Eucalyptus* dans le Gharb (Maroc occidental). **(The *Eucalyptus* in the Gharb region [Western Morocco]).**
Rev. Int. Bot. Appl. 1952 : **32** : 309–55.

Twenty-one species of *Eucalyptus* out of the 125 occupying four experimental fields in Western Morocco are described in detail. A discussion follows on the determination of *Eucalyptus* species by their external appearance; polymorphism and natural and artificial selection; hybridization in nature and as a method in breeding; soils, altitudes and rainfall, suitable for the cultivation in Morocco of the 21 species described; and the content of essential oils and the flowering time and nectar production of the same species.

1503 AKIMOV, P. A.
(Experiment on growing *Eucalyptus* trees in the Caucasus).
Lesnoe Hozjaĭstvo (Forestry) 1951 : No. 6 : 47–52. [Russian].

E. cinerea, *E. viminalis* and *E. Macarthuri* proved the hardiest species in the cold winter of 1949–50 at the Black Sea Littoral. Several other species and the hybrid between *E. viminalis* and *E. rostrata* are recommended as hardy material for trials and hybridization.

1504 ROHMEDER, M. and DIMPFLMEIER, R.
Larix decidua Mill. x *Larix Gmelini* Pilg., ein in Grafrath mehrfach natürlich entstandener luxurierender Bastard. **(*L. decidua* Mill. x *L. Gmelini* Pilg., a heterotic hybrid arising several times spontaneously at Grafrath).**
Z. Forstgen. Forstpflanzenz. 1952 : **2** : 16–19.

The hybrids referred to established themselves in a plantation of Siberian larches, which they ultimately overtook and excelled in growth. In most morphological features the hybrids are intermediate between the parental species but they exceeded both species in both height and diameter at comparable ages. The best hybrid had a height of 14·8 m. and a breast-height diameter of 28 cm. at the age of 16 years, which corresponds to the dimensions of a 30 year old tree of *L. Gmelini*.

Artificial hybrids between the two species are now under observation.

1505 Hall, M. T.
Variation and hybridization in *Juniperus*.
Ann. Mo. Bot. Gdn 1952 : **39** : 1–64.

A detailed analysis is given of the introgressive influence of *J. Ashei* upon *J. virginiana*. The differentiation of *J. virginiana* as a species in the different areas of the United States is discussed. Five races have been recognized: *typica*, the pure species; the Ozark, consisting of introgressants with *J. Ashei*; the Platte River, introgressants with *J. scopolorum*; the Northern, introgressants with *J. horizantalis*; and the Floridan race, comprising introgressants with *J. barbadensis*.

1506 Abotin-Pavlov, K. Ja.
(**Spruce originating from a pine**).
Agrobiologija (Agrobiology) 1952 : No. 5 : 30–35. [Russian].

A hundred-year-old pine with some spruce branches is described from Latvia. The evidence suggests that the branches could not have originated as a result of natural grafting. The appearance of the spruce on a pine is explained by Lysenko's theory of interspecific conversion.

1507 Jansen, E. C.
Kwaliteitsverbetering van de groveden. (**Quality improvement of the Scots pine**).
Tijdschr. Ned. Heidemaatsch. 1952 : **63** : 310–12.

Following the formation of a Dutch team for the selection and breeding of Scots pine in Holland, a survey of all stands in the country was completed in 1951; and the data obtained on their quality are being used in a systematic search for plus trees in superior stands to obtain high grade seed for future plantings. So far 60 trees have been found that can be used for breeding.

1508 Holten, J.
Lærken. (**The Larch**).
Svenska SkogsvFören. Tidskr. 1952 : **50** : 263–74.

In this lecture the world distribution of the larch, its characteristics and its introduction into Europe were reviewed, with reference to forestry in Scandinavian countries and Denmark in particular.

Among the merits of the hybrid between the Japanese and European larch is its resistance to serious damage by larch canker. The possibility of utilizing the progeny from this interspecific cross for seed is discussed in the light of experiments which the author is still pursuing in Denmark.

1509 Pozdnjakov, L. K.
(**A tree form of *Pinus pumila***).
Bot. Ž. (Bot. J.) Moskva 1952 : **37** : 688–91.

A natural hybrid between *P. pumila* and *Pinus sibirica* is described. It combines the moderate climatic and soil requirements of the former with the economic characters of *P. sibirica*.

1510 Mirov, N. T., Duffield, J. W. and Liddicoet, A. R.
Altitudinal races of *Pinus ponderosa* —a 12-year progress report.
J. For. 1952 : **50** : 825–31.

Analyses of the first 12 years' growth of seedlings derived from seed trees distributed from 125 to 6919 feet above sea level in the Sierra Nevada, Calif., have shown that the altitude of the parents has no influence on the winter hardiness of seedlings grown at 960, 2730 and 5650 feet. It was found, however, that seed trees from altitudes of 1500–3500 feet yield progenies which grow faster than seedlings derived from higher or lower slopes. Many seedlings originating below 1000 feet appear to be inbreds with poor form in addition to slow growth rate. Possible factors preventing the development of a genetically homogeneous population of fast-growing trees, hardy at all altitudes, are discussed. It is considered that small heritable differences in seedling physiology, influencing the establishment of seedlings, and slight variation in time of pollination associated with differences in altitude would be sufficient to maintain distinct altitudinal races.

VEGETABLES

1511 Work, P., Elle, G. O. and Cook, J. A.
Vegetable breeders offer new varieties for 1951.
Cornell Ext. Bull. 1951 : No. 827 : Pp. 8.

Varieties of potato, cabbage, mustard, onion, cucumber, water melon, tomato, beans and sweet corn, recommended for domestic and commercial cultivation in New York State, are described. Most of the varieties have been bred by experiment stations and seed firms in the United States. Of particular interest are three F_1 hybrid onions developed by Associated Seed Growers with the aid of male sterile lines: Asgrow Y–40 and Asgrow Y–41, both Early Yellow Globe types, and Asgrow Y–42, an Early Sweet Spanish type.

1512 Boswell, V. R.
Plant breeding and the vegetable industry.
Econ. Bot. 1952 : **6** : 315–41.

A survey is given of vegetable breeding, chiefly in the United States, from the earliest work up to the achievements of the present time.

1513 Crang, A. and Sturdy, M.
A comparison of some varieties of vegetables preserved by bottling, canning and freezing. Progress report I.
Rep. Agric. Hort. Res. Sta. Bristol 1951 : 199–206.

The report is presented of the results of a study of the colour, flavour and texture of varieties of asparagus, peas and broad, dwarf and runner beans after preservation by bottling, canning or freezing under domestic conditions.

1514 Eichenberger, M. E.
Sur une mutation survenue dans une culture de tissus de carotte. (**On a mutation that appeared suddenly in a tissue culture of the carrot**).
CR Soc. Biol., Paris 1951 : **145** : 239–40.

A sector rich in carotene was noted in a tissue culture of the carrot. Its origin is attributed to a somatic mutation.

1515 Vaarama, A.
Maatalouskoelaitoksen puutarhaosastolla v:na 1944 ja 1945 suoritettujen porkkanan lajikekokeiden tulokset. (**Results of experiments with recommended carrot varieties at the Horticultural Department of the Agricultural Experimental Station during the years 1944-45**).
Valt. Maatalousk. Tiedon. 1946 : No. 207 : Pp. 11.

Experiments to determine the suitability of several winter carrot varieties to cultivation under Finnish conditions are described. Data include quality and yield of roots and tops, and the varieties recommended as most successful are Amager, Feonia, Flakkeer and Lontoon tori [London Market].

1516 Hagiya, K. and Tazima, Y.
(**The incidence of bolting in radish varieties sown in autumn after vernalization and its application to breeding**).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 51–52. [Japanese].

Data are provided on the time and extent of bolting, and on the seed set in the bolted shoots, for a series of Japanese radish varieties sown on two dates in October after vernalization.

1517 Glaschke, B.
Kurze Beschreibung der zugelassenen Rettichsorten. (**A short description of the approved varieties of radish**).
Saatgutwirtschaft, Stuttgart 1952 : **4** : 108–09.

Varieties of early, summer, autumn, winter, and forcing radishes, officially approved by the committee authorized to revise the existing assortment in Germany, are listed and described.

1518 Ownbey, M.
Cytoplasmic inheritance and reciprocal amphiploidy in *Tragopogon*.
Genetics 1952 : **37** : 611–12. (Abst.).

In the F_1 of *T. pratensis* ♀ x *T. porrifolius* ♂ the ligules are only about half the length of the involucral bracts, and are brownish with conspicuous yellow tips. In the reciprocal F_1, however, the ligules are nearly as long as the bracts, deep red and without yellow tips. Long-liguled plants produce only long-liguled F_2 progeny; short-liguled plants give rise to F_2 offspring with ligules varying from shorter to longer lengths than in the F_1. Ligule colour is highly variable in the F_2, but yellow tips occur only among the progeny of yellow-tipped F_1 plants. All the F_1 progeny of *T. pratensis* ♀ x *T. dubius* ♂ have short ligules. Short ligules appear in the progeny of the cross between the short-liguled race of *T. miscellus* (amphidiploid *T. dubius* x *T. pratensis*) as female and *T. mirus* (amphidiploid *T. dubius* x *T. porrifolius*).

1519 Plinka, A. D.
(**Onion varieties forming bulbs within a year at the Gribovo Vegetable Breeding Station**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 8 : 50–53. [Russian].

Productive onion varieties, which form mature bulbs in a year in the central Nonblack-Earth Zone have been recently developed at the institute. Danilovskiĭ 301 was bred from a local variety in the Jaroslavlj province. Several groups of productive plants were selected and hybridized after each group had previously been grown under varied conditions. Danilovskiĭ 301 yields 32 tons per ha.; the bulbs reach maturity in 100–110 days, have good keeping properties, and weigh 75–100 grm. Odnoletniĭ Gribovskiĭ [One Year Gribovo] was obtained by hybridizing 50 samples of the Zittau onion. It has similar economic properties to those of Danilovskiĭ 301, except that its growth period is 5 days longer.

1520 **New onion hybrids show wide adaptability.**
Sth. Seedsman 1952 : **15** : No. 10 : p. 62.

Two new hybrids, Granex and Crystal Hybrid, have given outstanding yields in trials throughout southern USA. Granex is a large flat onion, light yellow in colour, with a mild flavour. Crystal Hybrid is a white variety, more pungent than Granex.

1521 IKUTAKE, M. and SUZUKI, I.
(A comparative study of strains of the Senshu onion).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 110–14. [Japanese].

Statistical analysis of bolting percentage and tuber yield revealed significant differences between Japanese strains of the variety Senshu [Izumi].

1522 PERLASCA, G.
Algunos problemas genéticos y fisiológicos que condicionan la producción de cebolla en el trópico. (**Some genetical and physiological problems affecting the production of onions in the tropics**).
Agron. Trop., Venezuela 1952 : **2** : 23–30.

Only the short-day varieties form bulbs in the tropics. However, odd plants of the long-day variety Imperial Yellow 49 when sown in Venezuela gave quite well developed bulbs. Other plants of this and other long-day varieties flowered freely without the bulbs being subjected to cold treatment. It is therefore considered that material suitable for selection should be sought not only in the short-day types but also in some of the long-day varieties, which possess many agronomically desirable features.

1523 TATEBE, T.
(On self fertility in *Allium fistulosum* and the onion).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 86–88. [Japanese].

The effect of open, cross and self pollination on the seed set of 9 strains of *A. fistulosum* and 9 strains of the variety Senshuki [Izumi Yellow] of *A. Cepa* was studied. *A. fistulosum* proved self fertile; *A. Cepa* was probably self fertile but the seed sets following the controlled pollinations were much less than after open pollination.

1524 KAHN, R. P.
An investigation of asparagus rust and its causal agent, *Puccinia asparagi* D.C., in Illinois.
Diss. Abstr. 1952 : **12** (Publ. No. 3141) : p. 9.

The so-called rust resistant asparagus variety Washington proved to be extremely susceptible to the disease in greenhouse and field tests under Illinois conditions. Strains of Washington from different sources and 21 other named varieties and selections showed marked differences in degree of rust susceptibility but none was resistant.

1525 GATES, R. R.
Wild cabbages and the effects of cultivation.
J. Genet. 1953 : **51** : 363–72.

Collections of wild cabbage (*Brassica oleracea*) growing in chalk soil on the English coast showed a very considerable increase in size when introduced into cultivation. A polyphyletic origin is postulated for the cabbage and related cultivated forms. The historical evidence suggests that cabbage and kale were derived from wild cabbages in Italy during pre-Roman times. Probably, however, cabbage and kale also arose from wild *B. oleracea* on the coasts of western Europe; Brussels sprouts may have had a similar origin. It is pointed out that it would be interesting to compare wild *B. oleracea* in Italy with the same species on the coasts of western Europe. Cauliflower and broccoli may have been derived from *B. cretica* in the eastern Mediterranean region; a species endemic to the middle Mediterranean area may have given rise to kohl rabi. Cytological changes accompanying the domestication of *B. oleracea* require investigation; alterations in chromosome size may have occurred, analogous with those known to have taken place during the domestication of the wild beet.

1526 KADOTA, T. and ITO, K.
(On improvement in fertility and inactivation of self incompatibility in the progenies of autotetraploid *Brassica pekinensis*).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 198. [Japanese]. (Abst.).

An improved seed set following self pollination was noted in colchicine-induced autotetraploid strains of the variety Nosaki 2.

1527 Konvička, O.
Příspěvek k výběrové technice při zušlecht'ovaní zelí. (**The question of methods of selection in cabbage breeding**).
Sborn. Česk. Akad. Zeměd. 1952 : **25** : 363–72.

A method of recording the growth form of individual cabbage selections, for comparison with later generations, is described. Heads are halved longitudinally and a wax or pitch print of the cut surface is made on paper. The selections can then be propagated vegetatively. The method can be applied to various other vegetables, including lettuce, *Allium* spp., red pepper, cucumber and *Phaseolus*.

1528 Shinohara, S.
(**Ecological studies on cabbage varieties. 2a. Length of bolting period in varieties of the warm region type and of the cool region type**).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 200. [Japanese]. (Abst.).

The length of the bolting period has been determined for summer and autumn sown cabbages of the following types: Japanese warm region types, Japanese cool region types, and European and American types.

1529 Tatebe, T.
(**Studies on the behaviour of incompatible pollen in *Brassica*. IV. Cabbage and cauliflower**).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 19–26. [Japanese].

The growth of pollen in the style was studied in self and cross pollinations of three cabbage and two cauliflower varieties. All the cabbage varieties were self incompatible except one strain of Nozakiwasei [Nozaki Early], while in the cross pollinations, both cross compatible and cross incompatible behaviour was observed. Similar results were obtained for the cauliflowers, but there was a greater incidence of self compatible strains.

1530 Kadota, T. and Ito, K.
(**On improvement in fertility and inactivation of self incompatibility in the progenies of autotetraploid *Brassica pekinensis***).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 151–55. [Japanese].

The fertility of colchicine-induced tetraploid strains of *B. pekinensis* was poor but improved in subsequent generations. Differences in seed set between selfed and cross-pollinated material in the later generations were not significant.

1531 Shisa, M. and Hazu, G.
(**Studies on resistance to snow in *Brassica*. I. Varietal differences in physiological characters associated with resistance to snow**).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 98–104. [Japanese].

The relationship between resistance to snow, on the one hand, and resistance to $KClO_3$, dry matter content per unit leaf area, assimilation rate and respiration rate, on the other, has been investigated in a series of Japanese *Brassica* varieties. In general, resistance to snow and resistance to $KClO_3$ were inversely correlated. After snowfall the dry matter content and assimilation rate of the varieties resistant to snow were higher than in susceptible varieties. During thawing, the respiration rate of the resistant varieties was comparatively low.

1532 Bain, D. C.
Reaction of *Brassica* seedlings to blackrot.
Phytopathology 1952 : **42** : 497–500.

The reactions of varieties of cabbage and other *Brassica* crops to black rot (*Xanthomonas campestris*) in the seedling stage are reported. The results suggest that selection for resistance to the disease in cabbage, and possibly also in related crops, should be successful.

1533 Odland, M. L. and Noll, C. J.
Pennvalley cabbage. A new yellows resistant variety.
Progr. Rep. Pa Agric. Exp. Sta. 1952 : No. 84 : Pp. 3.

Pennvalley is similar to Penn State Ballhead in type and yield, but has the advantage of resistance to *Fusarium* yellows. The head grows well off the ground. Pennvalley was developed by crossing Penn State Ballhead with Resistant Wisconsin Ballhead and backcrossing to the former.

1534 Persson, A. R.
Forsøk med norske sorter og stammer i høst- og vinterkvitkål 1947–50. (**Trials with Norwegian varieties and strains of autumn and winter cabbage, 1947-50**).
Forskn. Fors. Landbr. 1952 : **3** : 1–29.

Particulars are given of the yields, quality and suitability for storage of 36 Norwegian varieties of cabbage in trials at Kvithamar and Ås in Norway. First-class certificates were awarded to 14 varieties and strains, including the following which were obtained from Norwegian breeders or seed growers, though some were originally obtained by selection from Danish or other strains: Julikongen 1 [July King 1], Hinna Amager, Stavanger torg [Stavanger Market] 3 and 2, Trønder 4 and 5, Jåtun 8 and 9, Blåtopp 19 [Blue Top 19] and Rossebø 23. The variety L 1 (34), though too recent a selection to comply with the regulations for certification, is also listed with the certified strains on account of its high quality as a cabbage for storing. It may be of mutant or hybrid origin.

1535 ANDERSSON, G. and THORWALL, S.
Redogörelse för fröodlingsförsök med fodermärgkål vid Sveriges Utsädesförening 1945–1948. (**Report on seed production experiments with marrow-stem kale at the Swedish Seed Association 1945-48**).
K. LantbrAkad. Stockh. 1952 : **91** : 246–59.

Problems of the production of seed from marrow-stem kale are discussed with observations on cold resistance and possible causes of the difference between kale and winter rape in withstanding low temperatures. A possible method of ensuring better seed production of kale in Sweden by storing the plants during winter and replanting in spring is suggested. Large-scale seed production in Sweden must be preceded by systematic breeding of existing material for uniformity and better adaptation to Swedish conditions.

1536 ZLATKOVSKÝ, A.
Kříženec květáku a růžičkové kapusty—nový druh zeleniny ve stavu zrodu. (**A hybrid between cauliflower and Brussels sprouts—a new form of vegetable in the making**).
Sborn. Česk. Akad. Zeměd. 1952 : **25** : 387–91.

At the Praha-Troja Variety Testing Station a cross between the cauliflower Haagův Erfurtský Zákrsek k Rychlení [Hague Erfurt Early Dwarf] x Brussels sprouts variety Hercules has given a promising new form of vegetable producing heads of good flavour with a longer axis than the cauliflower.

1537 MIHAĬLOVA, L. V.
(**A rape originating from *Brassica oleracea* var. *capitata***).
Agrobiologija (Agrobiology) 1952 : No. 5 : 36–39. [Russian].

The study of interspecific conversion of the cabbage (cf. *PBA*, Vol. XXI, Abst. 2204) has been continued. *B. Napus* var. *esculenta* derived from cabbage has remained constant up to the third seed generation. The same cabbage seed from which the above form developed gave other variants including an individual of winter rape, *B. Napus* var. *oleifera*. This individual had the systematic characters of rape, was self fertile and had 36 chromosomes.

1538 ONO, H. and SAKAI, B.
Intergeneric hybridization in Cichorieae, XI. On the diminution of the chromosome number in the F_1-hybrid of *Paraixeris denticulata* and *Lactuca squarrosa*.
Cytologia, Tokyo 1952 : **17** : 97–103.

In the root meristems of each of eight F_1 hybrids of *P. denticulata* ($2n = 10$) x *L. squarrosa* ($2n = 18$) cells with different chromosome complements were noted. The majority of cells had 12 chromosomes of a similar caryotype, in which the four V-shaped chromosomes of *L. squarrosa* were missing; in place of the latter, two small fragments with kinetochores were substituted. Since meiosis is regular in both parents, it is suggested that fragmentation and elimination may occur as the *Lactuca* chromosomes enter the cytoplasm of the female parent. The appearance of a new caryotype immediately after hybridization may have considerable significance with respect to evolution of genera in the Cichorieae.

1539 MIDDLETON, J. T., HALL, B. J., WEDDING, R. T. and KENDRICK, J. B. (JUN.).
Adaxial crack stem of celery.
Phytopathology 1952 : **42** : 603–06.

In California the popular variety Utah 10B is very susceptible to this disorder, due to boron deficiency; Pascal and Golden Selfblanching have been unaffected.

1540 HOWARD, H. W.
Autotetraploid green watercress.
J. Hort. Sci. 1952 : **27** : 273–77.

Autotetraploid green watercress ($2n = 64$) has been obtained by colchicine treatment of a commercial stock ($2n = 32$). It has larger, broader and thicker leaflets than the ordinary form and may therefore be commercially valuable. Information on its yield, frost hardiness and resistance to crook root (*Spongospora*) is not however available at present. The possibilities of obtaining improved forms by doubling the chromosome number of autotetraploid *N. officinale* x *N. microphyllum* ($2n = 64$) and of the triploid brown cress are also discussed.

1541 FURUSATO, K. and TANAKA, M.
(On artificially induced polyploids of the melon).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 193–94. [Japanese]. (Abst.).

Colchicine-induced tetraploids of 7 melon varieties have been obtained. They differ from the parent diploids in having relatively shorter fruits, less fertile pollen and a lower seed set. Triploids were produced next by intercrossing tetraploid and diploid strains.

1542 UCHIKAWA, I.
(On the characters of a new form of melon and of some tetraploid plants).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 200. [Japanese]. Abst.).

By colchicine treatment of an ovoid-fruited melon, a new form arose with globular fruits. This new type, however, was diploid, though fertility was reduced and an occasional univalent was observed. By further colchicine treatment of the original material and of the new type, tetraploids were obtained in both instances. These had globular fruits; fertility averaged 48·5%, and up to 5 quadrivalents were formed at meiosis.

1543 EIDE, C. J. and MAKILA, A.
An isolate of *Fusarium* with unusual virulence for the resistant Iroquois muskmelon.
Phytopathology 1952 : **42** : p. 465. (Abst.).

F. bulbigenum var. *niveum* occurred on the musk melon Iroquois in Minnesota during 1951; this variety had formerly shown resistance in the field. Some of the isolates from wilted plants proved more pathogenic on Iroquois than on Golden Osage or Pride of Wisconsin, varieties which have been highly susceptible to common isolates. Previous work had indicated that isolates differ greatly in pathogenicity; this relative pathogenicity had however been the same in different varieties.

1544 **New melon!**
Sth. Seedsman 1952 : **15** : No. 11 : p. 89

The water melon Fairfax has been released by the US Bureau of Plant Industry. A long-fruited type, its chief advantages are good transportability and resistance to anthracnose and *Fusarium*.

1545 PARRIS, G. K. and ANDRUS, C. F.
The Ironsides watermelon. A new *Fusarium* wilt-resistant variety.
Circ. Fla Agric. Exp. Sta. 1950 : No. S–21 : Pp. 4.

Ironsides, a new wilt resistant water melon obtained from (Leesburg x Hawkesbury) x Garrison, was developed cooperatively by the Florida Agricultural Experiment Station and the US Regional Vegetable Breeding Laboratory. The melons are long, larger than either Leesburg or Hawkesbury, and have a dark green, ribbed rind, which is relatively thin but very tough and resistant to sunburn. The quality and sweetness of the red flesh resemble the Klondike varieties.

1546 **Burpee introduces the new Crystal Bell squash.**
Seed World 1952 : **71** : No. 7 : p. 8; also Sth. Seedsman 1952 : **15** : No. 11 : p. 76.

Crystal Bell, developed by the W. Atlee Burpee Co., USA, produces bell-shaped, scalloped, white fruits, about 7 ins. in diameter and 6 ins. deep when mature. It is regarded as superior to other squashes of this type mainly on account of its productivity and bush habit.

1547 SCHÖNIGER, G.
Vorläufige Mitteilung über das Verhalten der Testa- und Farbgene bei verschiedenen Kreuzungen innerhalb der Kürbisart *Cucurbita pepo* L. **(Preliminary communication on the behaviour of testa and colour genes in different crosses within the pumpkin species *C. pepo* L.).**
Züchter 1952 : **22** : 316–37.

Reference is made to the genes previously established for lignification and pattern of testa (cf. *PBA*, Vol. XXI, Abst. 2221). In crosses of Zucchino x Styrian oil pumpkin the F_1 and 75% of the F_2 had lignified seeds; the remaining 25% had varying degrees of lignification of the subepidermal layer of the outer integument and the intergrading of the degrees of lignification was such that no clear separation was possible into *hhNN* and *hhNn*; it seems that the Styrian pumpkin, though recessive for both lignification genes *H* and *N*, contains modifiers, not present in the Tschermak oil pumpkin, which tend to reduce the lignification in plants containing *N* but recessive for the the main gene *H*. The F_3 and back-cross results confirmed this interpretation.

Crosses with the Mischitz oil pumpkin showed this too to be recessive for genes *H* and *N* and to contain modifiers, though to a lesser degree than the Styrian form, and a more detailed examination of the later generations of the progenies from Tschermak's oil pumpkin revealed the presence of certain modifiers in that form too. There seems to be some association between these modifiers and the genes determining fruit form. The degree of lignification could be reduced, even in plants heterozygous for the *H* gene, by defective fruit development and other environmental influences. Several cases of mutation from *H* to *h* have been observed.

Dihybrid ratios for fruit pattern were observed in the F_2 from Zucchino with unpatterned fruit x Styrian oil pumpkin and in back crosses, which indicates that the fruit pattern of the Styrian pumpkin is conditioned by two genes, *A* and *B*. Only one gene was responsible for fruit pattern in the Mischitz form. The dark green shoots of the Styrian pumpkin proved dominant to the yellow shoots of Zucchino, the gene responsible being designated *FS*. This gene also causes dark orange fruits, being epistatic to gene *D* for yellowish-orange fruit, which occurs in Zucchino together with another partially dominant gene *E* for light-brown fruit; the Mischitz pumpkin is recessive in respect of both *d* and *e* and has very pale brown fruits. Various interactions of the colour genes were observed, in that shoot colour could also be affected by genes responsible for fruit pattern and fruit colour, or fruit colour by those responsible for shoot colour and fruit pattern. No genetical linkage was detectable between the genes determining fruit colour and pattern or those determining shoot colour and lignification of testa.

1548 Neumann, D.

Die Blühverhältnisse und der Frucht- und Samenansatz beim Ölkürbis (*Cucurbita pepo L.*) nach natürlicher und künstlicher Bestäubung. (**Flowering relationships and fruit and seed set in the oil pumpkin [*C. pepo* L.] after natural and artificial pollination**).

Z. Pflanzenz. 1952 : **31** : 513–44.

Observations on the course of flowering in the oil pumpkin are reported. When 2½ of the stigmatic lobes were removed and pollination was effected on the remaining half-lobe, full seed set was obtained, showing that pollen can pass from one section of the style to the others. Seven plants in two F_2 populations, consisting in all of 542 plants, from a cross of oil pumpkin x Kabachok bore a certain number of perfect flowers in addition to male and female flowers; the perfect flowers formed pollen but no seeds. Female flowers bagged immediately after the visit of a single bee failed to produce the full number of 300–400 seeds. The male flowers appear later than the female and the earliest ones are defective; pollen from early male flowers gave reduced sets of round 65%, though the amount varied in different lines. The proportions of male and female flowers varied with the spacing of the plants. The distribution of the 1st, 2nd, 3rd and 4th flowers on the different internodes of the main stem and branches differed in different lines.

The results of artificial pollinations were the same with all lines, the average set being 94·1%; the set in the 4th and later flowers was lower than in the first three. The set was invariably less in plants on which fruit had already set, and the reduction proved proportional to the numbers of seeds contained in the fruit already present. By removing this fruit, good sets in later flowers can be obtained. No reduction of fertility was observed in inbred material. Successful pollinations could be made only immediately after anthesis had occurred; the sets were less affected by time of day or temperature than by air humidity. Pollination with reduced quantities of pollen gave lower sets but supplementary pollination with large quantities of pollen gave no greater set than open pollinations, the number of seeds being evidently a hereditary character. Injection with α-naphthyl acetic acid tended to reduce seed set and extend flowering time.

Parthenocarpic fruits without seeds developed from eight flowers after pollination with *C. maxima*, but rye flour, *Avena* coleoptile powder and chalk had no effect; treatment of the ovules with α-naphthyl acetic acid gave rise to seedless fruits when applied to the first flowers but not later flowers.

Correlations between seed number and fruit weight were observable in some lines but not in others; there was however a negative correlation between fruit weight and number of seed per kg. of fruit. Seed yield was greater in fruits with 4 or more rows of seeds, the proportion of which varied in different lines. It should therefore be possible to increase seed yield, and hence oil yield, by selecting for high seed row number in the fruits.

1549 Saljnikov, V. V.

(**The Leningrad Glasshouse Horticultural Association**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 10 : 40–43. [Russian].

Several new varieties of cucumber bred at the USSR Institute of Plant Industry proved productive and early when grown under glasshouse conditions.

1550 Youngner, V. B.
A study of the inheritance of several characters in the cucumber, *Cucumis sativus* L.
Diss. Abstr. 1952 : **12** : No. 2659 : p. 372. (Abst.).

The inheritance of several characters was studied in crosses of the variety Lemon with Orient, Deltus and PI 127583. Sex form was determined by a single gene pair, *Momo*, the monecious condition being dominant over the andromonecious. One pair, *Ll*, differentiated the parents with respect to locule number; 3-locular fruits were completely dominant over 5-locular. Two pairs, Gr_1gr_1 and *Ww*, were responsible for immature fruit colour. The presence of both Gr_1 and *W* resulted in a dark green colour; Gr_1 and *Ww* produced light green fruits; gr_1gr_1 caused a yellow green colour, irrespective of the condition of *Ww*. Ovary protrusion depended on the pair *Pp*, non-protruding ovaries being dominant over protruding. Spine colour was also conditioned by a single pair, *Bb*, with black spines dominant over white. Sex form and ovary protrusion were completely associated, either as expressions of the same factor or as the result of complete linkage. Sex form and locule number were linked with a recombination value of 32·63 ± 1·41%.

1551 Aleksandrov, S. N.
(Using hybrid seed to increase the yield of indoor cucumbers).
Sad i Ogorod (Fruit and Vegetable Gardens) 1952 : No. 10 : 43–45. [Russian].

Heterosis was observed at the USSR Institute of Plant Industry in Mnogoplodnyĭ 564 [Many-fruited 564] x Gibrid Filova [Filov's Hybrid], Virovskiĭ Salatnyĭ 1295 [VIR* Salad 1298] x Gibrid Filova, Leningradskiĭ Tepličnyĭ 23 [Leningrad Warm Frame 23] x Gibrid Filova and the hybrids from direct and reciprocal crosses between Klinskiĭ 1545 and Leningradskiĭ Tepličnyĭ 23.

1552 Bonvicini, M.
Costituzione de nuove razze di pomodoro e produzione della semente. (**Creation of new tomato varieties and seed production**).
Atti III Giornata Derivati Pomodoro, Parma 1950 : Pp. 14.

At the Bologna plant breeding institute in Italy over 6000 types originating from 35 intervarietal crosses of tomatoes were under examination in 1949 and were compared with existing local and foreign varieties. The hybrids included a number of dwarf forms characterized by extreme earliness, and smooth or slightly ribbed fruits with high flesh content and vivid colour, suitable for conserving.

Some further desiderata in tomato breeding and the methods of maintaining purity by controlled seed production are discussed.

1553 Gagnebin, F.
La tomate naine canadienne Mendel. (**The Canadian dwarf tomato Mendel**).
Rev. Hort. Suisse 1952 : **25** : 393–97.

Bred at the Botanical Station of the University of Geneva from a cross between Best of All and a Canadian dwarf type, this new early tomato has 3–5 stems 30–50 cm. long and can therefore be grown under frames without trouble. Stopping and removal of axil buds has an injurious effect on yield. One line of Mendel, X/6/1, ripened 14 days before Best of All and gave an average yield of 2·006 kg. per plant; 81% of the fruits were without ribs. It is hoped to eliminate the ribbing of the original Canadian parent completely by further selection (cf. *PBA*, Vol. XXII, Abst. 3051).

1554 **Promising new southern tomato named Homestead.**
Seed World 1952 : **71** : No. 8 : p. 44.

Homestead (STEP 89), involving in its parentage Victor, Pan America, Rutgers and Dobbie's Champion, has given good results in Florida and other states. It possesses near-immunity to wilt, derived from Pan America.

1555 Lesley, J. W., Middleton, J. T. and McCarty, C. D.
Simi, a processing tomato resistant to *Verticillium* and *Fusarium* wilts.
Hilgardia 1952 : **21** : 289–99.

A detailed account is given of the tomato Simi (cf. *PBA*, Vol. XVIII, Abst. 2553). The variety is recommended for trial in the coastal region of southern California; it shows particular promise for processing into paste and other concentrates on account of its fleshiness and deep red colour.

1556 Whaley, W. G.
Hybrid vigor in a tomato cross.
Bot. Gaz. 1952 : **114** : 63–72.

Hybrids between a selection of the variety

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* Vsesojuznyĭ Institut Rastenievodstva [USSR Institute of Plant Industry].

Yellow Plum and a line of *Lycopersicon pimpinellifolium* showed advantage in plant weight, height, number of branches, number of leaves and total leaf area, when compared with the inbred parents; these advantages were established early. No significant differences in total nitrogen, total phosphorus and starch contents were recorded. The hybrids appeared to have a higher catalase activity in the stem tips. Evidence of differences between the hybrids and inbreds with respect to the pattern of development of total proteolytic activity waso btained. Investigation of the development of the enzyme systems and their activity during the leaf growth stages may therefore lead to an elucidation of the basis of heterosis. It is further suggested that biochemical mutations similar to those reported in the lower organisms may be concerned in heterosis.

1557 RICK, C. M. and BARTON, D. W.
The primary trisomics of *Lycopersicon esculentum*.
Genetics 1952 : **37** : 617–18. (Abst.).

Trisomics obtained from the progeny of triploids of the variety San Marzano could be readily classified into 12 morphological types. The pachytene chromosomes were identified with certainty in the case of 11 trisomics. Frequencies of trisomics in triploid progenies and of transmission of these chromosome types in trisomic families differed greatly for the various trisomics, and bore no simple relation to chromosome length at pachytene. Genes in linkage groups I to VIII were tested against 9 trisomics. The genes d_1, *wt* and *H* in linkage groups I, V and VII, respectively, exhibited trisomic segregation. The segregation data indicated that *l* in group VI and a_2 in VIII are carried on the same chromosome, and that *wd* represents a new linkage group.

1558 PADDOCK, E. F. and ALEXANDER, L. J.
Cauliflower, a new recessive mutation in tomato.
Ohio J. Sci. 1952 : **52** : 327–34.

A mutant with cauliflower-like inflorescences is governed by a single gene pair, *caca*, independent of the pairs *Ii* for reaction to *Fusarium* and *Hh* for stem hairiness. The mutant resembles "complex" (*ss*) but genes determining the two abnormalities were nonallelic. Modifiers apparently produce dwarfing of cauliflower inflorescences, but only under glasshouse conditions.

1559 BURDICK, A. B.
Experimental evidence relating to one postulate of the new Russian genetics.
Genetics 1952 : **37** : p. 570. (Abst.).

A study was carried out on grafts among nine tomato lines which differed in five monogenic characters and in quantitatively determined characters such as fruit size. None of the former type of characters studied, viz, fruit skin colour, flesh colour, pubescence, plant height and leaf shape, was changed in the stocks and scions, or their first seed generations. In many scions the size of the fruit was smaller than that of comparable fruit on ungrafted plants. The seed progenies of stocks and scions differed from the controls in dry weight of plant and number of days to anthesis under greenhouse conditions but the differences were not significant.

1560 **"Red Top" tomato introduced.**
Seed World 1952 : **71** : No. 6 : p. 44.

Red Top, developed at the New York State Agricultural Experiment Station, produces plum-shaped fruits especially suitable for industrial and domestic production of purée, pulp or paste.

1561 TAPLEY, W. T.
Red Top—a new paste tomato.
Fm Res. 1952 : **18** : No. 4 : p. 3.

Further information is given on Red Top, recommended for trial as a variety suitable for the manufacture of paste and several other products (cf. Abst. 1560).

1562 GRIFFING, B.
Contribution of genotypic and environmental effects to the relationships existing among tomato yield components.
Genetics 1952 : **37** : 588–89. (Abst.).

A statistical analysis was made of the influence of genotype and environment upon the relationships among yield components, using a series of homozygous parents and all possible F_1 crosses between them. An environmental correlation of $-0{\cdot}784$ was found between number of fruits per cluster and number of clusters, indicating within-plant competition for common substrate. Variation in fruit size was independent of variation in total number of fruits for plants of the same genotype ($r = -0{\cdot}056$). This independence is explicable on the grounds that most variation in fruit size is due to competition among fruits within a cluster. All the variables studied were highly correlated genotypically. It is suggested that the correlated responses are chiefly due to the pleiotropic manifestations of one gene complex, whose primary function is to control the balance between the competitive abilities of two opposing tendencies in growth, viz. increase in number of reproductive parts and increase in size of these parts.

1563 Winstead, N. N. and Kelman, A.
Inoculation techniques for evaluating resistance to *Pseudomonas solanacearum*.
Phytopathology 1952 : **42** : 628–34.

The relative effectiveness of different methods devised at the North Carolina State College has been evaluated, using large populations of tomato seedlings. Potato, tobacco and groundnut seedlings were also tested. The maximum differentiation between susceptible and resistant plants was obtained by pouring inoculum over lacerated secondary roots. This technique is therefore recommended for large scale selection under greenhouse conditions.

1564 Gallegly, M. E.
Sources of resistance to two races of the tomato late blight fungus.
Phytopathology 1952 : **42** : p. 466. (Abst.).

At least three physiological races of *Phytophthora infestans* have been identified. Tomato accessions resistant to two of these races are listed.

1565 Bonde, R. and Murphy, E. F.
Resistance of certain tomato varieties and crosses to late blight.
Bull. Me Agric. Exp. Sta. 1952 : No. 497 : Pp. 15.

When subjected to natural field infection by local races of *Phytophthora infestans* during 1951 in Aroostook County, Me., most of the varieties and F_1 hybrids which had previously shown foliage resistance under greenhouse conditions proved susceptible, with the exception of Red Cherry and Danmark x Red Cherry progenies. The latter maintained a high degree of foliage and fruit resistance the following year but were all small-fruited; back crosses to Danmark produced larger fruits but these were more susceptible to the pathogen. Hybridization with Trellis 22, an early maturing large-fruited variety with superior vitamin C content, also resulted in a slight increase in fruit decay and foliage lesions. Data suggest however that the homozygous dominant resistance of Red Cherry may be eventually combined with commercially desirable fruit characters.

1566 Henning, R. C. and Alexander, L. J.
Evidence of existence of physiologic races of *Alternaria solani* (Ell. and Mart.) Jones and Grout.
Phytopathology 1952 : **42** : p. 467. (Abst.).

Evidence of seven physiological races of *A. Solani* has been obtained, as a result of tests on seedlings of *Lycopersicon* spp.

1567 Scheffer, R. P. and Walker, J. C.
Distribution of *Fusarium* resistance in the tomato plant.
Phytopathology 1952 : **42** : p. 474. (Abst.).

From experiments with inoculated cuttings of highly resistant, moderately resistant and susceptible varieties, evidence has been obtained that resistance to *Fusarium* is not localized in the roots, as suggested by several other investigators, but occurs throughout the plant.

1568 **Keep your eye on Kopiah!**
Sth. Seedsman 1952 : **15** : No. 10 : 34, 56, 73.

Kopiah, a new tomato developed at Crystal Springs, Miss., for release in 1953, is derived from (Rutgers x *Lycopersicon pimpinellifolium*) F_3 x Early Rutgers, followed by numerous back crosses to Early Rutgers. It is resistant to *Fusarium* wilt, compares favourably with Rutgers in respect of plant vigour, fruit size, quality and appearance, yielding ability and earliness, and is equally suitable for the table or canning. Kopiah has proved adaptable to many central and northern states, but was bred primarily as an improved variety for southern conditions.

1569 Finlay, K .W.
Inheritance of spotted wilt resistance in the tomato. I. Identification of strains of the virus by the resistance or susceptibility of tomato species.
Aust. J. Sci. Res. 1952 : **5** : 303–14.

At the Institute of Agriculture, WA, four classes of spotted wilt virus, corresponding to the tip blight (TB), necrotic (N), ringspot (R) and mild (M) types separated by Norris (cf. *PBA*, Vol. XVIII, Abst. 1929), were distinguished among isolates obtained from Wanneroo Late, King Humbert and *Lycopersicon pimpinellifolium* growing locally and among introductions from the Waite Agricultural Institute, SA. Under greenhouse conditions simulating the local environment, the reactions of *L. peruvianum*, *L. pimpinellifolium*, Rey de los Tempranos [King of the Earlies], Pearl Harbour and Manzana [Apple] indicated the presence of distinct strains within each of the four groups. Altogether ten strains were identified. Since Pearl Harbour proved susceptible to TB_1, TB_2, N_2, R_2 and R_3, it is assumed that the high degree of resistance shown by this variety in Hawaii (cf. *PBA*, Vol. XVI, Abst. 986) is due to the absence of these strains from the spotted wilt complex of Hawaii. Similarly, the apparent resistance of Rey de los Tempranos and Manzana in New Jersey (cf. *PBA*, Vol. XVIII, Abst. 2556) must be due to the absence of strains TB_3, N_1 and R_1 in that area; the occasional occurrence of TB_1 and N_2 would break down the resistance of Manzana, while Rey de los Tempranos would remain unaffected.

Evidence of synergism was obtained from tests with *L. pimpinellifolium*, which proved resistant to R_2 and M_1 except in the presence of TB_2. In parts of Western Australia where TB_2 is widespread, it is therefore inadvisable to use *L. pimpinellifolium* for breeding purposes. Data on the resistance shown by Pearl Harbour and Rey de los Tempranos to some spotted wilt strains during the tests suggest that the resistance shown by their F_1 hybrid (cf. PBA, Vol. XXII, Abst. 1537) under local conditions may be due to the combination of both genotypes.

1570 Holmes, F. O.
Inheritance of resistance to tobacco-mosaic disease in tomato.
Phytopathology 1952 : **42** : p. 467. (Abst.).

Tobacco mosaic resistance in the tomato appears to be due to a single dominant gene.

1571 Goto, K.
[**Studies on heterosis in egg plants. (Preliminary report)**].
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 196. [Japanese]. (Abst.).

Marked yield increases were noted in the F_1 generation of a series of crosses between Japanese varieties.

1572 Srinivasan, V. and Jayabhima Rao, K.
Progress of pulses improvement work in Madras.
Madras Agric. J. 1952 : **39** : 478–84.

Work on the selection of high yielding strains of the following pulses at Coimbatore and elsewhere during the last eight years is surveyed: *Cajanus Cajan*, *Cicer arietinum*, *Dolichos biflorus*, *D. Lablab*, *Phaseolus Mungo*, *Ph. aureus* and *Vigna unguiculata*. Improved field strains of all the above species have been developed and are now being multiplied and distributed.

1573 Wohlrab, W.
Die Zuchtbuchführung in gartenbaulichen Samenzuchtbetrieben. (**Pedigree recording in horticultural seed breeding concerns**).
Saatgutwirtschaft, Stuttgart 1952 : **4** : 136–37.

The author's proposed criteria for pedigree recording in horticultural seed breeding are listed, the examples cited being for peas and beans. Judging of the various strains should be left in the same hands throughout the years.

1574 Skoog, H. A.
Studies on host-parasite relations of bean varieties resistant and susceptible to *Pseudomonas phaseolicola* and toxin production by the parasite.
Phytopathology 1952 : **42** : p. 475. (Abst.).

Population trends of *Ps. phaseolicola* within the leaf tissue of the resistant variety Mexican Red and susceptible Red Kidney were determined, following uniform inoculation. Increases in viable bacteria were very similar in the two varieties after the first three days subsequent to inoculating. A further increase occurred in the susceptible variety, accompanied by necrosis and collapse of leaf tissue about the sixth day. A lower population peak in the resistant variety was reached on the fifth day, followed by a decrease.

1575 Malinowski, E.
The problem of heterosis. VII. Vigorous growth and twining tendency in bush beans.
Bull. Acad. Polon. Sci. Lettres, Kraków 1951 (1952) : Sér. B : 77–88.

No twining tendency was seen among the field-sown F_1 progeny of a cross between nontwining *Phaseolus vulgaris* var. *melleus* and Inexhaustible, a variety which tends to twine when grown on rich soil. More nontwining than twining individuals occurred in the F_2. However, since subsequent progenies of both twining and nontwining plants comprised 10·5 and 12% twining individuals respectively, there appears to be little genetical distinction between twining and nontwining beans. The percentage of twining offspring increased to 34·19 and 34·28%, respectively, when seedlings were grown on rich soil in pots. Further analyses of the F_2 revealed that the twining plants were more vigorous than nontwining individuals with respect to plant height, vine weight and length of terminal leaflet, It is suggested that increased circumnutation may be another expression of heterosis.

1576 Iijima, T. and Shimizu, S.
(Studies on the processing characters of kidney beans. II. On kidney beans for processing as pork and beans).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 115–19. [Japanese].

Information is provided on seed shape and colour, consistency of the seed pod, flavour, suitability for canning in combination with pork, quality of the canned product, protein, starch, sugar, fibre, ash and vitamin B_1 contents, and calorific value of a series of Japanese and American varieties.

1577 Boldin, D.
(A new *Phaseolus* variety).
Kolhoznoe Proizvodstvo (Collective Farming) 1952 : No. 12 : p. 58. [Russian].

A new late variety, Kiev 5, more productive than the standard, Improved Robuste, has been developed at the Mironovskaja Breeding Station. It carries resistance to anthracnose and rust and has a 1000 seed weight of 468 grm. The seed is white and its cookability and protein content are good.

1578 Iijima, T. and Shimizu, S.
(Studies on the processing characters of kidney beans. I. On beans for drying).
Engeigaku Kai Zasshi/J. Hort. Ass. Japan 1951 : **20** : 44–50. [Japanese].

Starting with an assortment of 102 varieties, 9 were picked out as particularly suitable for processing, and three of the latter, Shokeimaruuzura [Small Round Mottled], Hotaka 2 [High Bunch 2] and Marukaigaramame [Round Shell bean], all of the Kanpyo type, were noted as of outstanding quality. Data are provided on the vegetative period, general morphological characters, yield and size of the pods and seeds, consistency of the pods and seeds, stringiness, flavour, degree of wrinkling of the pods, and resistance of the pods to *Macrosporium* for the nine varieties principally investigated. An association is noted between good quality, susceptibility to *Macrosporium* and degree of wrinkling of the pods.

1579 Hungerford, C. W.
Disease resistant field beans for Idaho.
Exp. Sta. Circ. Univ. Idaho Agric. Exp. Sta. 1952 : No. 118 : Pp. 11.

Work on breeding virus resistant beans for northern and southern Idaho is surveyed. The varieties UI Flat Small White 1 and 2, resistant to common mosaic, were released in 1946 for northern Idaho; they were developed from crosses between Flat Small White selections and the mosaic resistant Norida (Robust x Great Northern). Crosses between mosaic resistant selections of Great Northern and curly top resistant Red Mexican gave rise to three varieties, UI 3 Red Mexican, UI 4 Red Mexican and Great Northern UI 15, combining resistance to both diseases and suitable for southern Idaho. Hybridization between the Red Mexican and pinto types yielded three pinto varieties, UI 72, UI 78 and UI 111, resistant to both viruses. In 1941, a new form of common mosaic attacked these six new varieties; Great Northern selections previously released in southern Idaho showed resistance. Two hybrids (UI 31 and UI 16) of the Great Northern type, resistant to all three viruses, have been obtained. An attempt is now being made to develop Red Mexican and pinto beans also resistant to the new mosaic.

1580 Pollard, L. H.
Lima beans, possible new crop for Utah.
Fm Home Sci. 1951 : **12** : p. 25.

Among the lines so far developed in Utah, Utah 16 is the most promising with respect to yield and quality, but is susceptible to seed rot under adverse conditions in early sowings. It is to be crossed with rot resistant lines.

1581 Kendrick, J. B. (Jun.) and Allard, R. W.
A root rot tolerant lima bean.
Phytopathology 1952 : **42** : p. 515. (Abst.).

In California the Lima bean selection L–4 has shown a high degree of tolerance of root rot caused chiefly by *Rhizoctonia Solani* and *Fusarium Solani* f. *Phaseoli*. It produces vigorous long runners, and seed of the calico type with red irregular splotches on a white background. The selection is being used to introduce tolerance of root rot in green processing varieties.

1582 Bartley, B. G. and Weber, C. R.
Heritable and nonheritable relationships and variability of agronomic characters in successive generations of soybean crosses.
Agron. J. 1952 : **44** : 487–93.

An estimation of variability within and between F_2, F_3 and F_4 progenies of Hawkeye x Ottawa Mandarin, Lincoln x Ottawa Mandarin and

Lincoln x Hawkeye, with respect to date of maturity, seed yield, plant height and resistance to lodging, has been completed at Ames, Ia. Data on the ratio of genetic to total variance, provided by regression of progeny means on the means of their parents, are presented. Heritability estimates for maturity date and plant height were sufficiently large in all populations to indicate that selection for these characters would be effective. Since progeny-parent regressions for seed yield were consistently low, it is assumed that yield is influenced by nonheritable factors. Estimates for lodging differed widely in the three crosses.

1583 PROBST, A. H. and CUTLER, G. H.
Blackhawk soybeans for Indiana.
Sta. Circ. Purdue Agric. Exp. Sta. 1952 : No. 385 : Pp. 11.

Detailed and up-to-date information is given on the soya bean Blackhawk, derived from a cross between Mukden and Richland (cf. *PBA*, Vol. XXI, Abst. 1445 and 2258).

1584 **LSU develops new Pelican bean.**
Soybean Dig. 1952 : **12** : No. 10 : p. 20.

The yellow-seeded soya bean Pelican, developed at the Louisiana State University Agricultural Experiment Station, Baton Rouge, is particularly suitable for soil improvement or hay. The seeds have high oil and protein contents.

1585 NAGAMATSU, T., ANEZAKI, Y., KIZAKIHARA, C. and NAKAMURA, M.
(Induction of tetraploid soya beans by colchicine treatment).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : p. 197. [Japanese]. (Abst.).

A description is given of the tetraploid strains produced. They showed several of the usual morphological polyploid characters; seed setting was reduced, and both bivalents and tetravalents occurred at meiosis.

1586 NAGAMATSU, T., ANEZAKI, Y., KIZAKIHARA, C. and NAKAMURA, M.
(The induction of tetraploidy in the soya bean by colchicine treatment).
Ikushugaku Zasshi/Japan. J. Breeding 1952 : **1** : 172–79. [Japanese].

Colchicine-induced tetraploids have been obtained for two ecological types of Japanese soya bean. Meoisis in the tetraploids is described. The morphological and physiological differences between the diploid and tetraploid strains are analysed. In respect of economic characters, the differences were seldom large, though a slightly higher raw protein content was noted in the tetraploid strain of the yellow type than in the corresponding diploid.

1587 ROMPIETTI, A.
Rilievi sui rendimenti e sul potere germinativo della soia in ambiente siccitoso. **(Observations on the yields and germination capacity of the soya bean in a dry environment).**
Ann. Sper. Agr. 1952 : **6** : 1307–28.

Experiments on 66 varieties in the province of Florence showed that drought reduces both yield and germination capacity. Selection in conjunction with studies of microclimates, to which some superior biotypes might be adapted, is recommended, in order to obtain types of soya bean suitable for arid conditions.

1588 HILDEBRAND, A. A.
Stem canker. A disease of increasing importance on soybeans in Ontario.
Soybean Dig. 1952 : **12** : No. 9 : 12–15.

Diaporthe stem canker has recently become the most serious disease of soya beans in Ontario. The introduction and widespread cultivation of the susceptible varieties Hawkeye and Blackhawk have been coincident with the sudden severity of the disease. Of the 11 varieties tested in 1951 for reaction to stem canker, Harman showed the least susceptibility.

1589 KELLENBARGER, S.
Inheritance and linkage data of some characters in peas (*Pisum sativum*).
J. Genet. 1952 : **51** : 41–46.

Descriptions are given of the following five new mutants arising in experimental plots at Pullman, Wash., with information on their inheritance and linkage relations: a yellow green mutant of Alaska governed by a single recessive gene, designated *yg*, which is linked to the basic gene for anthocyanin (*a*) with 11·2 ± 0·9% recombination; yellow green 2, obtained after X irradiation of Alaska, with a tendency to become more yellow than the yellow green mutant, and again dependent on a single recessive gene which is, however, inherited independently of *a* and *r;* a mutant (Idaho White x Idabelle), with elongate leaves and stipules inherited independently of *a*, *fa*, *gp*, *i*, *k*, *r* and *st*, breeding true and producing a normal F_1 when crossed with normal plants; a green and yellow striped variant of First and Best due to a dominant mutation which is lethal when homozygous; and a dwarf mutant, derived from Blackeye, with abnormally curled leaves bearing shiny spots, which breeds true but produces a normal F_1 when crossed with normal plants. A sixth true-breeding mutant, termed screwball, arose in Alderman at Hamilton, Mont.; its curled leaves are dependent on a single recessive, designated *sb*, which is linked to the recessive *i*, determining green cotyledons, with 11·9 ± 0·5% recombination.

1590 Šakurov, V. Z.
(**Increasing the vitality of pea varieties**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1952 : No. 7 : 43–49. [Russian].

The production of heterotic seed of peas at the Kazanj State Breeding Station is discussed. It was found that the intervarietal combinations vigorous x dwarf, large-seeded x small-seeded, late x early and green-seeded x yellow-seeded, were heterotic. The later generations of these hybrid combinations segregated in respect of various economic characters. Viktoria Mahndorf x Capital, for instance, is reported as giving in the F_3 "12·12% plants with a 1000 seed weight of 150 grm., 62·67% with 226 grm. and 25·13% with 264 grm." The degree of heterosis differed appreciably in direct and reciprocal crosses. Hybrids between biologically different but morphologically similar varieties such as Capital and Torsdag [Thursday], or Kazanj 104/2 and Kazanj 216, were also heterotic. Kazanj 104/2 and Kazanj 216 had been previously bred at the institute. They are early and have large seed. Kazanj 104/2 is hardy and Kazanj 216 shows tolerance of drought and has indehiscent pods.

Reference is made to an artificial population 644 which has outyielded Torsdag by 4·5 c. per ha. and has maintained heterosis for several generations. The population was derived from multiparental pollination of Kazanj 104/2 and Kazanj 216.

1591 Lienhart, R.
Remarque à propos du travail fondamental de Gregor Mendel. (**Note on the fundamental work of Gregor Mendel**).
CR Soc. Biol., Paris 1947 : **141** : 182–83.

It is pointed out that Mendel noted, in his crosses between smooth and wrinkled peas, that the characteristics of the seeds of the hybrid progenies became apparent immediately after fertilization. This is attributed to the action of the hybrid embryo on the developing seed.

1592 **New pea for Wisconsin.**
Crops & Soils 1952 : **5** : No. 3 : p. 22.

New Era, a pea of the Perfection type, suitable for canning, has been released by the University of Wisconsin. It is resistant to bean virus 2, wilt and near wilt, and matures 2–3 days sooner than Wisconsin Perfection.

1593 Sortsforsøg med foderærter og kogeærter 1949–51. (**Trials with fodder peas and cooking peas, 1949-51**).
Tidsskr. Planteavl 1952 : **56** : 155–58.

In this prelininary report, the performance of five Swedish and Danish varieties of fodder peas and three varieties of cooking peas in Danish trials is recorded, with tables showing, among other points, yields of seed and straw, time of flowering and ripening, crude protein content and cooking time.

1594 Garber, K.
Beobachtungen über die Eignung ausländischer Herkünfte von Erbsen- und Bohnensorten für den Anbau in Norddeutschland unter besonderer Berücksichtigung der Verwendung für die Tiefgefrierindustrie. (**Observations on the suitability of varieties of peas and beans of foreign provenance for growing in Northern Germany, with special reference to utilization for the deep freezing industry**).
Angew. Bot. 1952 : **26** : 147–61.

The results of four years of tests of 42 varieties of peas and 34 of beans are set out in tabular form, showing the characteristics of the seed and plant, the yield, quality and suitability for the freezing process.

1595 Mehta, T. R.
Gram type 87.
Agric. Anim. Husb. Uttar Pradesh 1950 : **1** : No. 3 : 61–64.

Type 87 of gram (*Cicer arietinum*) was developed from a cross between a white-seeded late variety, Type 1, and a brown-seeded early gram, Type 15. It is medium in maturity, high yielding and widely adapted in Uttar Pradesh; it produces plump grains of uniform brown colour.

1596 Schnack, B. and Fernandez, O.
Números cromosómicos de cuatro especies cultivadas. (**Chromosome numbers of four cultivated species**).
Bol. Soc. Argent. Bot. 1946 : **1** : 285–86.

Chromosome numbers reported are *Polygonum* *baldschuanicum* $n = 10$, *Stizolobium Deeringianum* and *S.* aff. *cinereum* $2n = 22$, and *Gaillardia pulchella* $n = 17$ and $2n = 34$, not $n = 18$ as reported by previous authors.

1597 Del Valle, C. G.
El maíz dulce. (**Sweet corn**).
Bol. Estac. Exp. Agron. Cuba 1952 : No. 62 : Pp. 19.

Attempts to introduce sweet corn varieties from the North American continent into Cuba have been unsuccessful, owing to the difference in photoperiod and insect attack, and breeding work was started in 1937; by crossing the local flint maize Provincia $PF(MS)_1$ with American sweet corns and back-crossing to the local type, followed by open pollination in isolation, two suitable varieties, Gondera and Pajimaca, have been obtained and are described. The second is the more popular, having grains with softer pericarp than Southern Cross Bantam and a considerably higher sugar content than even Golden Bantam.

1598 Murray, M. J.
Evolutionary trends and species barriers in three genera, *Acnida*, *Amaranthus*, and *Mentha*.
Genetics 1952 : **37** : 608–09. (Abst.).

The wind-pollinated genera *Acnida* and *Amaranthus* developed three sex forms and aneuploidy early in their evolutionary history. In contrast, evolution in *Mentha* has involved changes in the diploid chromosome number, ranging from 18 or 20 to 40, and from 24, 36, 48, 72 to 96. A study of many intergeneric and interspecific combinations has so far indicated that the two major genera involve species of divergent and separate origins, and that the generic boundaries are at best a convenient but artificial grouping of allied species. The species barriers are both genetic and nongenetic, certain barriers presumably being the consequence of adaptive evolutionary changes independent of hybridization. Detailed investigation of several species has further indicated that quantitative genes account for the major interspecific differences, and that hybridization rather than mutation has often been the chief evolutionary factor.

1599 Ivašenjko, A. A.
(**A method of propagating peppermint with rhizomes**).
Sovetskaja Agronomija (Soviet Agronomy) 1951 : No. 2 : 80–88. [Russian].

A new productive and hardy variety, 541, showing a high degree of resistance to rust, has been developed at the Lubenskaja Research Station. It is notable for vigorous branching and many small leaves, which remain attached to the plant until maturity; the menthol content of the oil is 75%. The variety can be propagated by rhizomes.

BOOK REVIEWS

Hyndman, O. R.
The origin of life and the evolution of living things. An environmental theory.
Philosophical Library, New York, USA 1952 : $8·75 : Pp. xxi + 648 : 42 figs.

If Dr. Hyndman had had some experimental evidence in proof of his thesis that the environment constitutes the prime factor in evolution, it could probably have been presented in some six pages in a scientific journal. Instead we are faced with over 600 pages of closely printed text embodying an elaborate, often ingenious, argument, presented in a laboured and intensely repetitive form, designed to convince us that catalytic chain reactions arose in stages, in response to environmental stimuli, leading to the origin of life, which is conceived as the "effect of energy field on states of matter", with the "incorporation of catalytic substances in the formula". This process is referred to as the "first order of differentiation". Integration into colonies is the "second order," and diploidization provides the third. This makes possible the differentiation of function in the somatic phase, followed by "dedifferentiation" upon the formation of gametes. The author's argument against the possibility that an organ such as an eye could have evolved by natural selection is that he is "certain that the time required for the development of this organ on the basis of random changes would at least exceed the age attributed to the earth by a wide margin". As regards mutations it is stated that "the evidence does not make it credible that 'mutations' as defined could even *serve* as a *mechanism* for evolution". The process here envisaged is one of change in the soma in response to some functional requirement, the change being transferred to the chromatin by the soma fluids which bathe also the germ cells. The progressive changes by which the genes have evolved are then recapitulated in the ontogeny of each individual. The elaborate description of how all this happens seems to be purely fanciful and though introducing a mass of new terms such as *chromatin stencil, reacthins, lamina specifics* and a host of others, makes scarcely any appeal to experimental evidence. The concepts presented have more verisimilitude to-day than would have been conceded them ten years ago, in the light of some of the results with adaptation in microorganisms; yet these results are nowhere referred to; again, no cognizance is taken of modern work on embryology or photoperiodism, though results of Sachs, cited from Loeb (1906 and 1916) are mentioned in connexion with regeneration. Evidence is also taken from the work of Kammerer, Burbank and Mičurin. The entire argument against mutation as an evolutionary factor overlooks the threshold effects studied by Goldschmidt and others. It is insisted that a polyphyletic theory of the origin of species is the only one consonant with the facts, the "environment of origin" impressing upon each its characteristic features. How this happens is rarely explained; the evolution of the eye, for instance, is explained as "a conditioned adaptation, meaning that 'light waves' were utilized in the adaptation of a mechanism of meeting the exigencies of the environment. The light spectrum is a part of the environment and as such will be incorporated in one way or another in the formula of adaptation". Any element of trial and error is ruled out categorically: "Nature makes no errors and is committed to no trials," but apart from this the "explanation" more often than not comprises an enumeration of the degrees of complexity through which a given organ or function is supposed to have passed. Those suggestions of a mechanism, such as the "purposeful selection of chromosomes, or determiners, during the synaptic phase of oogenesis," seem somewhat naive and again there is no suggestion as to how this purposeful selection, or selective segregation as it is referred to elsewhere, operates, beyond the suggestion that "unwanted determiners can be discarded in the first polar body". Thus the onus of selection is transferred from environment acting on individuals to some hypothetical "motivation" which sees to it that "optimally adapting units (determiners) will progressively converge" at the time of oogenesis. Botanists will also be surprised at the crucial function ascribed to the centrosomes.

The concept that the earliest living things procured their energy by oxidizing various elements including sulphur, iron and nitrogen, and that only those utilizing carbon proceeded to the higher degrees of evolution is attractive, and we could have wished for some more concrete evidence in support of this as well as some of the other theses, such as the view that resemblances such as those between the main groups of anthropoids are the result of common environment rather than common descent. "An organism", we are told, "inherits a form that is an expression or a summation of all previous responses to environmental influence and now confronts an environment the specific influence of which will be contingent upon the existing nature of the organism".

The style of presentation, though often naively appealing, is so repetitive as to make continued attention almost impossible; nor is it unexceptionable grammatically; and we feel that the familiar argument of the monkies on the typewriter has lost rather than gained in force by attributing "Pilgrim's Progress" to Milton.

GOODWIN, T. W.

The comparative biochemistry of the carotenoids.

Chapman & Hall, Ltd., London 1952 : 50s. : Pp. x + 356 : 33 figs. : 48 tables.

Although it is generally agreed that the carotenoids are amongst the most fundamental biochemical constituents of plants and animals, there is remarkably little evidence as to their precise role. Dr. Goodwin, well-known for his researches on the conversion of carotenoids into vitamin A in the mammals, has done what he can to elucidate this problem by a monographic review of the distribution of the various carotenoids in the plant and animal kingdoms together with an account of what little is known of their biological functions. Surveys naturally tend to make rather indigestible reading, especially when comprehensive generalizations cannot be drawn, but as a source of reference for biologists and biochemists, Dr. Goodwin's survey should prove of much value. The information provided is mainly on the presence or absence of the various carotenoids, quantitative data being reproduced when available. The chemistry of the carotenoids is only touched upon lightly, though the many cases of doubtful chemical identity are discussed more fully. Absorption spectra are given for most of the compounds discussed.

The sections on the functions of the carotenoids are very unequal and serve more to indicate what research is needed than what has been already done. An exception must be made however for the work of Porter and Lincoln, who have used genetical techniques for elucidating the biogenesis of carotenoids in the tomato fruit and for the series of researches that have elucidated the connexion between vitamin A and its precursors. These studies, however, definitely stand apart; little but speculation has been devoted to the greater part of the field of carotenoid physiology.

Plant breeders will find that the genetic basis of carotenoid content and the existence of varietal differences are treated briefly. In general, however, values for carotenoid contents are reported for species as such, a procedure of somewhat questionable value in view of the considerable variation due to genetic and environmental factors.

One of the most useful features of the book are the extensive bibliographies that follow each chapter. A drawback is the small-sized print of the entire book. A reader hoping to obtain a synthetic picture of the biological role of the carotenoids will be disappointed; in part the author's rather disconnected treatment may be to blame, but the principal reason, as Dr. Goodwin himself emphasizes, is the present immaturity of the subject.

WARDLAW, C. W.
Phylogeny and morphogenesis. Contemporary aspects of botanical science.
Macmillan and Co., Ltd., London 1952 : 42s. : Pp. viii + 536 : 173 figs.

Both formal morphology and the construction of phylogenetic trees are now out of fashion, largely because the inconclusiveness of so much morphological and evolutionary speculation has become evident. The interest to-day has shifted to experimental morphogenesis and genetics, where more concrete results seem obtainable. Professor Wardlaw, whose researches on the causal determination of the form of the pteridophyte stele have constituted a major contribution in the field of experimental plant morphology, has in *Phylogeny and Morphogenesis* set out to review the results obtained till now in the field of experimental morphogenesis, to present the relevant theoretical concepts and hypotheses utilized, and to relate these to the older morphological and phylogenetic views that still linger in our text books.

It is obvious that this is no light programme. The plan followed by the author starts with a general account of comparative morphology, from whence he turns to the paleontological evidence for the course of evolution of the pteridophytes and the origin of the leafy shoot. Then, after a brief discussion of theories of the origin of land plants, chiefly based on Bower and Fritsch, a fairly elementary account is given of plant genetics, with special reference to the genetics of morphological development. The author really gets into his stride in chapter XII in which, and in the two following chapters, he outlines what is known of the biochemistry of plant development. Next, after a somewhat perfunctory tribute to mathematics, the results of recent experimental morphogenesis are described, including the important work of the author himself. Two theoretical chapters on the nature of biological organization and on the future development of experimental morphology bring the book to a close.

Professor Wardlaw has performed a great service in assembling, for the first time, so comprehensive a range of material on one of the most recent branches of botany; and his book, with its copious bibliography, provides all that is needed for an introduction to the main subjects discussed. Yet in spite of the broad approach, it is difficult to avoid the impression that the book skims too lightly over the major theoretical issues. One is tempted to compare it with a thorough description of the tools on a carpenter's bench. This is doubtless worthwhile, but one is naturally more interested in seeing what can be made with them. For example, one encounters in the course of the book the contributions of the formal morphologists, various types of phylogenetic speculation, physiological genetics, phase gradients, field theory, D'Arcy Thompson's coordinate deformation, diverse theories on the nature of biological organization, a little mathematics and Woodger's application of symbolic logic to biological problems, but these items remain isolated and unintegrated, and their interrelations obscure. It is true, of course, that adequate data are not available for a final synthesis; all the same, sufficient work has surely been done to call for a more sustained effort to analyse and coordinate what is already known.

CROIZAT, L.
Manual of phytogeography.
Uitgeverij Dr. W. Junk, The Hague 1952 : 45 Guilders : Pp. viii + 587 : 106 figs.

A subtitle more descriptive of the contents of the above volume would be *A Disquisition on the Pernicious Hallucinations of the Borealists*, for the author, well-known for his taxonomic work in North and South America, has made no pretence of compiling a general account of the principles of plant geography; what he has done has been to assemble an extensive corpus of distributional data telling against the theory that the angiosperms arose in the northern hemisphere, and indicating instead an origin in Gondwana on the site of the present southern Indian Ocean. The procedure used to establish this conclusion is to analyse the present distribution of a large series of related species and other taxonomic entities and to apply to these Lam's concept of the genorheithrum, or as the author prefers, genorheitron, which is described as a "stream of plant-life in motion laden with evolutive potential".

The author undoubtedly presents a powerful case in support of his thesis, which has every appearance of being correct for some families. Of particular value is his frequent castigation of those systematists who appear to imagine that species or genus splitting nullifies the propriety of comparing remote vicariants. It is pointed out that, from an evolutionary point of view, it is far more important to recognize the obvious affinities of nearly related taxonomic groups than to shut one's eyes to these in the determination to devise new names for groups characterized by minute differences from their allies. It is in this connexion that the author deals very fairly with Willis's theory of Age and Area, which provoked such a hostile reaction among many taxonomists. He also adopts a most refreshing attitude to the angiosperm families, which are so often regarded as sharply circumscribed groups. It is shown clearly that in order to study the world distribution of a group of comparatively closely related plants, it may well prove necessary to transcend the limits of the family. Thus it is pointed out that a balanced view of the distribution of the Primulaceae depends on a prior realization that this family is only separated by convenience from the Myrsinaceae. Even more boldly, the author is undeterred by the label gymnosperm applied to the Gnetales. The distribution of this group is considered in relation to that of the Monimiaceae and the Chloranthaceae and the author goes on to observe sagely that "it is we who are responsible for the very set of characters whereby an 'angiospermous' style is supposedly characterized. Thus, we are stopped on our way by academic definitions of our own making".

While the author's iconoclasm is one of the most valuable features of his book, his attitude to other lines of research bearing on plant evolution is less satisfactory. While it is undoubtedly true that much can be learned from the present distribution of plants alone, it is extremely difficult to establish anything approaching a definitive conclusion without integrating these results with comparative cytogenetic studies and with the geological evidence for the configuration of the land masses in earlier epochs. These topics are only considered desultorily by the author, thereby weakening considerably the conviction that his distributional studies might otherwise carry.

Opinions may differ on the literary qualities of the author's presentation. There is, for instance, a surfeit of abuse showered on those who prefer a holarctic origin for the angiosperms, and a particular quotation, on this topic, which appears to have annoyed the author in particular, is irately reproduced in practically every chapter of the book. On the other hand the author writes with a picturesque vigour which pleases if it sometimes fails to convince. Have the Aceraceae ever been more poetically described than as "the boreal rump of the Sapindaceae"?

ANDREWS, F. W.
The flowering plants of the Anglo-Egyptian Sudan.
T. Buncle & Co., Ltd., Arbroath, Scotland
1952 : 21s. : Pp. viii + 485 : 166 figs.

The second volume of this flora continues along the same lines as the first (cf. *PBA*, Vol. XX, p. 592), following a modified form of Hutchinson's classification adapted for the Anglo-Egyptian Sudan. Keys and descriptions are given for 49 dicotyledonous families, ranging from the Sterculiaceae to the Dipsacaceae. The standard of the descriptions is maintained and many of the illustrations are taken from the same sources as those of the first volume, thus preserving a uniform appearance.

Flore du Congo Belge et du Ruanda-Urundi. (**Flora of the Belgian Congo and Ruanda-Urundi**). **Spermatophytes.**
Institut National pour l'Étude Agronomique du Congo Belge, Bruxelles 1948 : **1** : Pp. 446; 1951 : **2** : Pp. 609; 1952 : **3** : Pp. 579 : figs. : plates.

In 1942, a committee was instituted under the auspices of the Institut National pour l'Étude Agronomique du Congo Belge and the Jardin Botanique de l'État at Brussels to plan a comprehensive flora of the Belgian Congo and the mandatary territory of Ruanda-Urundi, to deal not only with the flowering plants, but also the ferns, mosses and thallophytes; in addition an introductory volume is envisaged on the history of the botanical exploration of the Congo and on the phytogeographical regions. The magnitude of this programme requires no emphasis, yet already three volumes of the flora have been brought out, the first dealing with the gymnosperms and the families Casuarinaceae to Polygonaceae according to Engler's arrangement in the *Syllabus*, the second covering the families Chenopodiaceae to Hamamelidaceae, and the third, the Rosaceae, Connaraceae, Mimosaceae and Caesalpiniaceae. For each species, a bibliography is given, followed by the botanical description, distribution within the Belgian Congo and elsewhere, ecology, vernacular names and uses. The genera and species are all keyed. Representative species of the major genera are illustrated by line drawings, and photographs and coloured plates of noteworthy species are also included.

It would be hard to overestimate the value of a monographic flora of this sort, dealing as it does with one of the richest floras in the world, and it is to be greatly hoped that the committee responsible for the flora will be enabled to bring out the later volumes as expeditiously as the first three. The general plan of the flora is irreproachable; the only addition that might be suggested is a brief indication of the taxonomic status and affinities of the species described.

Alexopoulos, C. J.
Introductory mycology.
John Wiley & Sons, Inc., New York and Chapman & Hall, Ltd., London 1952 : 56s. : Pp. xiii + 482 : 187 figs.

A text book of mycology in which the author aims at "an orderly presentation of certain fundamental facts on the structure and classification" of the organisms concerned "without the innumerable details and exceptions which make the study of fungi so fascinating for the specialist, but so bewildering for the beginner", will be welcomed in many quarters, and here the author has succeeded admirably in his task, although it should not be supposed that the treatment is as elementary as he insinuates in the preface. At the same time, the book will be invaluable to the nonbotanist, as the subject matter and the technical terms employed are fully explained, and the excellent glossary is easily referred to.

All classes of fungi are treated, together with bacteria and slime moulds, the general procedure being to give a broad description of the characters of each class with an outline of its classification, and then to illustrate each family by a fairly detailed life history of a particular member, collating the information in a general summary at the end of each chapter. The economic importance of the genera discussed is also briefly considered.

A very good picture of the real nature and value of biological classification is rendered; the reasons governing the choice of the particular system followed by the author are given, and sufficient is indicated of the various alternative systems to enable the student to see fungal taxonomy in true perspective.

The book is both well and profusely illustrated throughout, life cycles of the individual species described being a particular feature. Numerous excellent photographs are also included, but it is to be regretted that, with some exceptions, there is no indication of scale. Taken in conjunction with adequate laboratory studies, however, this should not prove a serious drawback.

R. H. R.

Evans, J. W.
The injurious insects of the British Commonwealth.
Commonwealth Institute of Entomology, London : 1952 : 30s. : Pp. 242 : 1 plate.

Concise information on the distribution and economic significance of insect pests of agriculture, horticulture and forestry in the British Commonwealth, with the exception of the British Isles, India and Pakistan, is provided by this useful work of reference compiled by a former member of the staff of the Commonwealth Institute of Entomology. In order to avoid much of the repetition which would have resulted from considering each country separately in the main part of the book, the insects are dealt with in order of species and genera under alphabetically arranged subfamilies and families within their respective orders. Comparisons of incidence in different countries are thus facilitated. Selected references to original papers have been included, but for the convenience of Commonwealth entomologists who rarely have access to more than a fraction of these, most references are made to the *Review of Applied Entomology*. The major part is preceded by sections giving an outline of insects of medical and veterinary importance in each country. Sections on insect control of weeds, plant quarantine, virus vectors and other special problems are also included, brief mention being made of selection and breeding of plants resistant to insect injury, with special reference to *Empoasca facialis*. The scope for future research and the need for greater cooperation between Commonwealth entomologists are among the aspects receiving particular emphasis.

Téllez Molina, R. and Alonso Peña, M.
Los trigos de la Ceres Hispanica de Lagasca y Clemente. (**The wheats of the Ceres Hispanica of Lagasca and Clemente**).
Instituto Nacional de Investigaciones Agronómicas, Madrid 1952 : Pp. xii + 516 : plates.

At the beginning of the nineteenth century two distinguished Spanish botanists, Mariano Lagasca and Simón de Rojas Clemente, interested themselves in the cultivated plants and established a truly remarkable collection of local forms and varieties of cereals, the study and description of which were to form the basis of a monograph, *Ceres Hispanica*. The greater part of it however remained unpublished but the material has been preserved at the Madrid Botanical Garden; the present authors in this fine volume give us a vivid account of the activities of Lagasca and Clemente and of that part of the *Ceres Hispanica* comprising the wheats, which they have reexamined in the light of more modern ideas on the taxonomy of the genus *Triticum*. In the second part all the wheats in the collection are classified, according to Flaksberger's latest system; the chief forms are illustrated, some in coloured plates and others in photographic reproductions of the original herbarium sheets.

Appendixes reproduce Lagasca's original system of classification and a brief preliminary description of the collection by Clemente, designed to precede the projected *Ceres*.

Hunter, H.
The barley crop.
Crosby Lockwood & Son, Ltd., London 1952 : 21s. : Pp. ix + 187 : 21 figs. : 26 tables.

Nobody is more qualified to write a book about barley than Dr. Hunter, who has himself done so much towards its improvement, and this small volume embodies much of the knowledge acquired in a lifetime of work devoted to this one crop. After a brief introduction, the various systems of classification of cultivated barleys proposed by different authors are outlined, those of Atterberg and Bergal being reproduced in some detail. Chapter III examines the evidence concerning the types of barley grown in Britain in early times, from the Neolithic age onwards, chapter IV gives data on acreage and yield in different parts of the world, and the factors influencing them, and chapter V describes the main botanical and agricultural varieties of barley cultivated in the British Isles and their origin. Questions of quality are dealt with in Chapter VI, where some of the author's experiments on the effect of nitrogenous manuring and other factors are recounted. The relative commercial merits of varieties of malting barley are discussed somewhat fully in Chapter VII, based on trials carried out in Ireland in the early years of this century and in England at the National Institute of Agricultural Botany from 1921 on; the characteristics of each of the main varieties are described separately; the descriptions include varieties such as Goldthorpe, Chevallier and Old Irish which were important in the earlier years of this century, as well as some observations concerning the behaviour in England of the Scandinavian barleys of the Kenia series. This chapter contains a valuable summary comprising a survey of the barley variety position in Great Britain over the last 50 years, from which it is seen that the increase in yield accruing from the use of improved varieties amounts to 20% and has been accompanied by an improvement also in quality and standing power. The value of selection work in producing these improved varieties is illustrated in the next chapter by reference to Tystofte Prentice, the various Archer selections made in Ireland and in England and the author's own experiments with Spratt-Archer. Questions of manuring barley are considered again in Chapter IX, largely by reference to the famous Rothamsted experiments, and "Breeding objectives" in Chapter X; in both, emphasis is laid on the need, at least as far as malting barley in Great Britain is concerned, of combining considerations of yield always with those of quality of grain and straw, a point which emerges again in the final chapter, in which we see the surprising extent to which requirements in these respects are still met by the two barleys Plumage-Archer and Spratt-Archer, in spite of increasing competition with the Kenia series, possessed of high yielding and standing abilities combined with earliness, but deficient somewhat as regards quality. In feeding barleys on the other hand the prime considerations are seen to be yield and standing capacity.

The book is furnished with some excellent illustrations and, apart from one or two minor points such as the identity of the barley referred to cryptically as "Razza" on pp. 163 and 164 and certain orthographical uncertainties such as "raches", "impliment" and "dessicated", is accurate and attractively presented and will long serve as a useful source of information on an important cereal which, as we see in the Introduction, has a wider ecological range than any other grain.

MACMILLAN, H. F.
Tropical planting and gardening with special reference to Ceylon.
Macmillan and Co., Ltd., London 1952 : 5th Ed. : 30s. : Pp. x + 560 : figs.

Apart from the addition of very few minor footnotes and a prefatorial remark, drawing attention to the fact that nearly all the illustrations are from the author's own photographs, this manual, which was issued as a fifth edition in 1943 and subsequently reprinted in 1946, 1948, 1949 and 1952, is substantially the same as the fourth edition published in 1935 (cf. *PBA*, Vol. VII, p. 263).

BROOKS, R. M. and OLMO, H. P.
Register of new fruit and nut varieties 1920-1950.
University of California Press, Berkeley and Los Angeles, and Cambridge University Press 1952 : 22s. 6d. : Pp. 206.

Some 1100 promising varieties developed in North America over a period of 30 years are listed and for each variety brief remarks are made on the following: the correct varietal name and synonyms, the originator, date of commercial release, patent details, parentage and qualities. The compilers have obtained their information on each variety from the originator or another responsible person acquainted with its history, and subsequent checking has ensured the accuracy of the statements, so that the book can be relied upon by growers and breeders to whom it is recommended. It should be pointed out that much of the material has already appeared in separate lists published since 1944 in the *Proceedings of the American Society for Horticultural Science*; many people will, however, appreciate having the information available in a single volume. The reproduction is by photo-offset and indexes are arranged so that a variety may be traced by name, species, place of origin or patent number, but some mention of the crop name on each page, perhaps at the top, would make reference even more easy. In a list which is emphatically claimed to comprise varieties of North American origin it is surprising to find a scattering of indisputably North African, Scandinavian, Russian and other European varieties.

Tuinbouwgids 1953. **(Horticultural guide, 1953).**
Uitgave der Directie van de Tuinbouw, Den Haag 1953 : f 5 : Pp. 651 : figs. : plates.

The tenth and current edition of this well-known reference book for horticulturists has been compiled on the same lines as the previous issue, reviewed in *PBA*, Vol. XXII, p. 319.

In the foreword, the editor, Dr. F. W. Honig, who is Director of Horticulture in Holland, announces as an innovation the inclusion of coloured, instead of black-and-white, plates illustrating plant diseases. The 12 plates will, it is hoped, be of assistance to growers confronted with the task of identifying and combating diseases and pests of their crops.

Provision has again been made for foreign users by the glossary, now classified by subjects and extended to 22 pages instead of 6. Dutch, English, Swedish, French and German equivalents are given to assist readers in consulting the tables and other material in this useful work and should extend its sale in many other countries as well as Holland.

Biological hazards of atomic energy.
Oxford University Press, London 1952 : 35s. : Pp. x + 235 : figs. : tables : plates.

This admirable volume, beautifully printed on excellent paper and in an attractive form, represents the proceedings of the conference on "The biological hazards of atomic energy," sponsored by the Institute of Biology and the Atomic Scientists' Association, with the support of the British Association and the British Institute of Radiology, and held at the Royal Institution on 20 and 21 October 1950. The purpose of the conference was to obtain, as far as possible, a balanced picture of the biological hazards, both short- and long-term, arising or likely to arise from the development and application of atomic energy now and in the future. The papers presented cover a wide range of aspects of the subject; thus F. G. Spear, in *The biological response to penetrating radiations* surveys the manifold way in which exposure in ionizing radiations may affect living cells; L. H. Gray, *Biological damage induced by different types of ionizing radiation*, compares the effects of different kinds of radiation on growth, mitotic inhibition and other chromosomal phenomena. Biological efficiency of radiations is closely related to the "linear density of the ions along the track of the ionizing particles," and fast neutrons are 10 times as effective as γ rays, α rays being twice as effective still.

R. S. Russell and R. P. Martin, *Biological effects of radioactive isotopes in plant physiological studies.* Damage from radioactive isotopes was detected by increased upward translocation and occurred in concentrations of 4 μc/l. upwards. The various macroscopic effects are described. They include both stimulation and reduction of shoot and root development, and alterations in the growth curve. These observations, and other evidence cited, suggest that many at least of the results of radiation are indirect, physiological rather than direct target effects.

C. D. Darlington, *The cell and heredity under ionization.* The consequences of irradiation upon the chromosomes are envisaged as a process of chromosome breakage, which is most frequent at periods of greatest cellular activity at the beginning and at the end of the resting stage. The effects are manifested only when the cell goes into mitosis. Many of the breaks may form viable recombinations, which will contain genetic changes which will be subject to selection in the same way as spontaneously occurring changes. Further experiments needed for assessing the likely results are suggested.

D. G. Catcheside, *Genetic effects of radiations.* Frequency figures for dominant lethals indicate them to be a target effect, probably due to chromosome breakage. The nondirective nature of the process is emphasized. The mutation rate per gene per generation seems to be the same in different species, the dose giving an induced mutation rate equal to the spontaneous rate being about 50 r. The most serious consequences of repeated applications of this order of dosage would be the minor, less obvious changes which nevertheless reduce the fitness of apparently normal individuals.

K. Mather, *The long-term genetical hazard of atomic energy.* The view is taken that a species such as man has a reserve of small heritable variations ample for very extensive changes over many generations and there can be "nothing but genetical disadvantage for man in artificially raising his mutation rate, by irradiation or any other means, above that which has sufficed for his evolution up to the present." Present levels of radiation do not seem to constitute a serious menace to the genetical development of society, the main factor tending to increase these hazards being the reduced selection pressure that comes with social progress.

E. B. Ford, *The influence of radiation on the human genotype.* The figure of 30 r. is given as the dosage which doubles the mutation rate. Any rise in mutation rate in man is regarded as undesirable since it increases the wastage against which the race must battle, though it will not affect the course of human progress which is a selection process.

T. C. Carter and R. S. Phillips, *An experimental attempt to investigate the induction of visible mutations in mice by chronic gamma irradiation.* A spontaneous mutation rate of 0·88 recessive visible mutants per 100 completely tested gametes was established for mice. This rate was not increased by γ-ray treatment with an average of just over 75 r. in protracted doses.

G. Pontecorvo, *Problems of cell population in irradiated tissues.* It is emphasized that published figures for the dosage required to double mutation rates are applicable only to nondividing mature spermatozoa and that nothing is known of the fate of cells carrying mutant genes in complex tissues after irradiation.

A. Glücksmann, *Tumour induction by penetrating radiation.* The different ways in which radiations may induce tumour formation are discussed.

W. V. Mayneord, *The organization of protective measures against radiation hazards.* British and international regulations for protection against radiation are outlined, stressing the need for more fundamental biological information.

G. J. Neary, *The evaluation of tolerance levels.* Various methods of estimating maximum permissible exposures are presented.

J. S. Mitchell, *Tolerance levels for fast and thermal neutrons.* Calculations are submitted for determining the maximum permissible flux of neutrons of different velocities in an 8-hour period in any one day, with indications of the fate of neutrons on being absorbed by soft tissues. It is emphasized that the calculations concern direct effects and that little is known concerning genetical effects.

W. G. Marley, *Some observations on the control of radiation hazards at A.E.R.E., Harwell.* An outline is given of the measures taken to record the radiation received and to prevent overexposure and contamination.

E. E. Pochin, *Control of hazards and irradiation in the clinical use of radioiodine.* Precautions adequate in using radioiodine in routine radiotherapy, even in quite high dosage, are described.

A. S. McFarlane, *Considerations governing the use of radioactive iron in humans.* Special factors contingent upon the particular distribution of iron in the tissues are discussed.

J. Vaughan, M. Tutt and B. Kidman, *The biological hazards of radioactive strontium.* Data are presented on the retention of strontium and yttrium, on the factors influencing it and the reasons why radiostrontium is so effective in producing tumours.

A. M. Brues and A. N. Stroud, *Retention of C^{14} administered as bicarbonate to adult and embryonic mice.* Data are given on the basis of which new permissible levels can be calculated, and showing that the dangers of using C^{14} for clinical studies have been overrated.

R. M. Sievert, *Tolerance levels and Swedish radiation-protection work.* In outlining recent Swedish experience the view is expressed that the genetic dangers are slight.

J. F. Loutit, *Possibilities of protection against massive doses of ionizing radiation.* Reference is made to various treatments which seem to afford some measure of protection.

W. M. Dale, *The indirect action of ionizing radiations in aqueous solutions and the specificity of the 'protection-effect.'* The protection effect shown by certain chemicals such as thiourea is in harmony with the theory of indirect action as opposed to the target theory.

F. W. Spiers and P. R. J. Burch, *Measurement of the normal radioactivity of the body.* Methods of measurement of the radiation from normal individuals and from persons subjected to varying degrees of exposure are described.

C. A. Coylson, *Atomic energy: the moral issue.* The moral responsibility of scientists in the positive use of atomic energy is emphasized.

K. Lonsdale, *The scientist's responsibility as a citizen.* The wider issues facing the general public are illustrated by reference to the paucity of information on safety regulations and health conditions in radioactive mines.

Survey of biological progress. Vol. II.

Academic Press Inc., New York 1952 : $7·00 : Pp. v + 333 : figs. : plates : tables.

This volume, though akin in most essential respects to the various "annual review" series with which most readers will be familiar, differs in one important feature, namely that it covers progress over a period of two and a half years (cf. *PBA*, Vol. XX, p. 361). We cannot but feel that this is an advantage, since it enables each review to be more of a synthesis and less a mere catalogue of work done. The field covered is a wide one, the reviews are authoritative and maintain a high standard of accuracy.

In the first, *Effects of radiations on biological systems* (pp. 1–52), A. H. Sparrow and B. A. Rubin first of all outline the technical advances that have been made since the beginning of the century, and the changes in views concerning the mechanism of biological action of radiation, which is coming more and more to be viewed as a complex chemical rather than a direct target effect. A most adequate review, though compressed, is given of the more recent studies on genetical and cytological effects of radiation, emphasis being throughout on the differences between the effects of different kinds of radiation. The physiological consequences of irradiation, including that from atomic weapons, are also discussed.

In *Progress in human genetics* (pp. 53–77) H. Kalmus gives an objective review of a subject in which the element of speculation is greater even than in the genetics of other organisms. Certain common misapprehensions, such as those concerning the genetical dangers of radiation, are corrected and certain rather futile controversies, such as that concerning the rhesus factor, are used to illustrate the view that there is a limit to the usefulness of some of the earlier genetical concepts such as that of the gene; "we are passing from a geometrical concept of the locus to a more physical concept, one of chromosome regions where hereditary properties can be described in chemical terminology." Another controversial issue discussed dispassionately is that of the ideal type to breed for, and as regards men and women it is concluded that emotional stability and social adaptability are at least as important as what has been referred to as "intelligence."

In *Biological oceanography* (pp. 79–104), G. A. Riley defines the subject as the ecology of marine populations. Being one of the newest of the scientific disciplines, it is reviewed historically.

Morphogenesis in plants (pp. 105–140) is reviewed by E. Bünning. Polarity, one of the age-old problems of the physiologist, is considered to be the consequence of asymmetry in protoplasmic structure in the peripheral parts closely adjoining the cell wall; this structure can be altered by certain agencies such as centrifuging, which suggest that it is a result of the orientation of the molecules situated in the peripheral strata of the protoplasm, leading to electrical potentials, chemical gradients and their various consequences. Removal of these gradients leads to cancerous growth.

Regions of protoplasmic growth are incompatible and a locus of strong growth tends to suppress a weaker one, owing apparently to the quantitative predominance of certain enzymes in the meristematic cells. The further fate of the cells to form Anlagen and the various organs is guided by a number of determiners and regulators, about which present knowledge is extremely limited, in conjunction with external factors, the most important of which is light. Possible relationships between the diurnal rhythm of auxin production and photoperiodism are discussed.

In *The control of plant growth by the use of special chemicals, with particular emphasis on plant hormones* (pp. 141–95), by L. G. Nickell, information published from 1947 to the middle of 1951 is reviewed. The subjects discussed include the merits of various selective weed killers; the successful use of hormones for vegetative propagation of special trees such as *Ginkgo,* mango and cacao; the prevention of sprouting in onions, potatoes and roses; stimulation of wound healing; induction of parthenocarpy; control of abscission; and overcoming self sterility. The mode of action of plant growth substances is discussed, with particular consideration of their effects on enzymes and their cytological action, and special attention is called to the similarity of action in plant hormones and viruses, and its possible significance. This contribution ends with over 17 pages of references, itself a token of the rapid growth of the subject.

Histochemistry (pp. 197–221), by F. Moog outlines the contribution of new techniques such as electron, polarization and phase microscopy; staining methods for detection of proteins, nucleic acids and phosphatases, showing the intimate relation that exists between them; the localization of nucleic acids by ultraviolet absorption studies, and the extension of the technique to other substances and radiations; and the use of microdissection and allied techniques for the localization of cell processes, all pointing to the role of nucleic acids and phosphatases in protein synthesis, and their close connexion with genic material, viruses, killer substance and other bodies endowed with the capacity for self reproduction. Highly significant patterning both in space and time of enzymes and other substances has been revealed by these detailed studies, even within unpartitioned cytoplasm.

The fine structure of protoplasm (pp. 223–57), is treated by L. H. Bretschneider. The view that living protoplasm must have a filamentary ultrastructure is given much support by recent studies with the electron microscope; the transverse axis of the filaments varies from 80 to 200 Å which would permit of a maximum of 4–10 protein chains side by side. The filaments are arranged in a quasihexagonal lattice and are bound together in bridges at periodically recurring points of attachment. The units of the lattice are styled leptons. Many cell structures such as the capsule membrane of bacteria are only one lepton thick and others, such as the axis of salivary gland chromosomes of *Drosophila,* prove to consist of numerous parallel filaments in aggregation. Other aggregations lead to myosine filaments and fibrils whilst a meshing process in combination with a lipoid layer leads to windowed membranes and other familiar structures. Cross striations resulting from molecular chains that are in some places coiled and in others extended, evidently result from inherent properties of the molecule, since they are reproduced when fibrils are dissolved and reprecipitated. Thus molecular periods, which are determined by valence bonds, lead to micellar periods, recognizable in ultrastructure as cross striations, lepton lattices, etc., which with further repetition and periodicity give rise to structural features of the next order such as chromidia, biosomes and chromomeres, and these in turn to the next order such as chromosomes, plastids, caryomeres, and these again to cellular periods and so on. Enzymes and autoreproductive systems are inserted into the structure probably at the order of the lepton nodes.

In *Physiology of reproduction in plants* (pp. 259–300), A. W. Naylor makes a comparison of the factors which control reproduction in fungi, algae, bryophyta, pteridophyta and seed plants. A variety of hormonal substances are involved and differences in C/N ratio seem to be the result rather than the cause of floral initiation.

DEMEREC, M. (Editor).
Advances in genetics, Volume IV.
Academic Press Inc., New York, USA
1951 : $7·50 : Pp. ix + 343 : figs. : tables.

Apart from certain inaccuracies in the Latin names of organisms in the section on cotton breeding, the fourth volume of this admirable series maintains the high standard set by previous volumes (cf. *PBA*, Vol. XXI, p. 450). The first review is by S. Gluecksohn-Waelsch on *Physiological genetics of the mouse;* followed by E. Hadorn, *Developmental action of lethal factors in* Drosophila; and A. Hannah, *Localization and function* of *heterochromatin in* Drosophila melanogaster; next comes a review by C. A. Krug and A. Carvalho, *The genetics of* Coffea, in which a general review of coffee genetics is presented, with the inclusion of some unpublished data;

the review gives an outline of the taxonomy of the genus *Coffea*, its cytology and floral biology, the genetical relationships of the different types and varieties, and the results of inter-specific hybridization.

The following review is by R. Matthey on *The chromosomes of the vertebrates*, followed by S. Nagao, *Genic analysis and linkage relationship of characters in rice*, in which special attention is given to results published in the Japanese language; he considers genes for colour in various organs, genes for dwarfness and various other mutant characters; reviews the situation concerning linkage; and makes some suggestions for a modified system of nomenclature of the genes in rice.

T. R. Richmond in *Procedures and methods of cotton breeding with special reference to American cultivated species* traces the early stages of cotton improvement by selection, the introduction of various refinements into the methods, such as Hutchinson's progeny-row system, Harland's mass-pedigree selection, bulked progeny-tests, back-crossing methods and the use of indigenous and wild stocks from Central America and Asia; the possible use of heterosis and hybrid seed is discussed guardedly; and technological advances in evaluating fibre properties in breeding material and the results of breeding for improved fibre quality, disease resistance and adaptation to mechanical harvesting are outlined.

S. G. Stephens in *Possible significance of duplication in evolution* analyses the different ways in which a gene locus may be duplicated and cites cases in which duplicated genes have apparently diverged in the amphidiploid cottons; hexaploid wheats and certain other species provide possible examples of the same process, which may be a means by which new loci can arise in evolution.

The last contribution is by M. J. D. White on *Cytogenetics of orthopteroid insects.*

NEW JOURNALS

Agriculture and Animal Husbandry, Uttar Pradesh.

This journal is intended primarily for farmers in Uttar Pradesh, and is published to aid the Field Extension Service which is being organized. It includes articles on crop varieties and breeding.

The first number appeared in January 1950. Further details may be obtained from the Bureau of Agricultural Information, Department of Agriculture, Chota Chatar Manzil, Lucknow.

Instituto Nacional de Investigaciones Agronómicas: Anales.

The first number of this new series, devoted to the publication of results of investigations carried out at the institute, contains two articles on wheat varieties (cf. Absts. 210 and 255) and the second number an article on Spanish citrus varieties (cf. Abst. 1434). The *Anales* are well and attractively produced and further information is obtainable from Instituto Nacional de Investigaciones Agronómicas, Alcalá 54, Madrid, Spain.

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